BUREAU OF HYGIENE AND TROPICAL DISEASES.

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## RELAPSING FEVER AND OTHER SPIROCHAETOSES.

NICOLLE (Charles) & ANDERSON (Charles). Fièvre récurrente transmise à la fois par ornithodores et par poux. [**Relapsing Fever transmitted by both Ticks and Lice.**]—*C.R. Acad. Sci.* 1926. June 14. Vol. 182. No. 24. pp. 1450–1451.

—— & ——. Fièvre récurrente transmise à la fois par ornithodores et par poux. Étude expérimentale de la récurrente espagnole.—*Arch. Inst. Pasteur de Tunis.* 1926. Sept. Vol. 15. No. 3. pp. 197–228. With 7 charts. [9 refs.]

The authors point out that one of them has long believed that relapsing fever transmissible by both ticks and lice would be found to occur. This view arose from the fact that in Tunis epidemics of the disease appeared to commence in the southern districts, from which it spread over the entire country. It did not appear that the conditions of life in the south were suitable for the maintenance of relapsing fever in the inter-epidemic periods if lice alone were responsible for transmission. It was suspected, therefore, that though the epidemic spread was undoubtedly due to lice the maintenance of the disease in the south was due to ticks. The theory was carefully tested by experiments with *Ornithodorus savignyi* which occurs in the south, and the strains of the louse-borne spirochaete. Though the most careful transmission experiments were undertaken it was not found possible to transmit the disease by this tick. The recent discovery by S. DE BUEN of a Spanish relapsing fever transmitted by *Ornithodorus marocanus* has given the authors another opportunity of testing their theory. Infected ticks were obtained and a series of experiments instituted. It was found that the ticks readily infected a guineapig and a monkey by their bites and upon the monkey lice were fed. With these lice it was found possible to convey infection to monkeys by introducing material from crushed lice beneath the skin, on scarified areas of skin and into the conjunctival sac, this being the method by which infection occurs in nature in the case of louse-borne spirochaetosis. In no case did the bite of the louse transmit infection, the earlier work on the mechanism of louse transmission being completely confirmed. It was thus demonstrated that the relapsing fever spirochaete of Spain was transmissible by both ticks and lice. Attempts to transmit the spirochaete by *Ornithodorus savignyi* resulted in infection by injection of crushed ticks but not by the bite. The

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evidence appears to support the theory that relapsing fever is maintained in endemic form in Spain by *O. marocanus*, and though DE BUEN could obtain no evidence that the disease, as studied by him in Spain, was spread by lice it seems not improbable that, should it assume an epidemic character, this would be due to louse transmission.

As regards the development of the Spanish spirochaete in lice confirmation of the earlier work was obtained. It was noted that the spirochaetes ingested by the lice quickly disappeared from the intestine and though the lice were carefully examined spirochaetes never reappeared in them. The lice, nevertheless, were most infective on the 8th and 9th days after feeding. In the original work with the louse-borne spirochaete it was found that the spirochaetes quickly disappeared but reappeared in the body fluids on the 6th to the 8th days. It was noted that the lice were most infective at the moment of reappearance of spirochaetes or just before this. This fact and that of the failure of the Spanish spirochaete to reappear in the lice, which were, nevertheless, infective, is an indication that infection is always due to the introduction of invisible forms of the organism. The failure of the Spanish spirochaete to reappear is thought to be due to the fact that it was less adapted to development in the louse than the one habitually transmitted by this insect.

The authors describe in detail the infections produced in monkeys, mice, rats, guineapigs and rabbits by the Spanish spirochaete. The general tendency is for these animals to show a severe relapsing type of infection differing from that produced by the louse-borne spirochaete of N. Africa, which produces few, if any, relapses and a less severe infection. The Spanish tick-borne spirochaete thus resembles the tick-borne spirochaete *T. duttoni* of Africa in its behaviour in experimental animals. In human beings, as described by DE BUEN, the Spanish relapsing fever resembles the African tick fever rather than the louse-borne disease.

As regards the specificity of the tick-borne spirochaete of Spain the authors state emphatically that in their opinion cross immunity experiments should not be used as a basis of distinguishing species of the relapsing fever organisms.

It seems to the authors that their theory has received definite support from the experiments detailed above, and they still think that the relapsing fever of Tunisia will be found to be maintained in the south by ticks. They see in relapsing fever a disease originally tick-borne, the spirochaete of which, becoming adapted to life in the louse, has accordingly spread over the world wherever these insects occur. A disease originally endemic in character has thus become a world wide epidemic owing to its acquired transmissibility by lice which are carried by human beings wherever they go.

C. M. Wenyon.

STRONG (Richard P.). **Spirochaetal Infections of Man.**—*Fourteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1925. pp. 218–239. [6 refs.]

The paper is mainly a general review of the state of knowledge regarding the various human spirochaetal infections. One condition not hitherto recognized is, however, described. This is a granulomatous dermal form of spirochaetosis classified with syphilis and yaws in the infective granulomata. The disease as observed in a patient in the

Amazon Valley is a chronic one and confined to the feet. A condition simulating this one was described by THOMAS in Manaos in 1910 and BREINL in Australia in 1911. In neither of these cases was a histological study made nor was the cause ascertained, though THOMAS reported its transmission into the nose of a rabbit and stated that the condition appeared to be infective keratosis. In one case from the Amazon Valley the lesions bore a superficial resemblance to epithelioma but on closer examination they were seen to consist of closely-packed individual papillomata forming confluent patches of granulomatous tissue which ulcerated and then healed with the production of a large amount of scar tissue. When some of the tissue is removed and moist preparations made from the cut surface are examined with the dark-field a picture like that of relapsing fever blood is seen. In stained films, however, the spirochaetes are more numerous than they ever are in relapsing fever and appear coarser and larger. Fusiform bacilli were not seen. Attempts were made to infect monkeys subcutaneously and rabbits by injection of material into the testicle. In the case of the rabbits a central area of necrosis developed and in it were found an occasional coarse spirochaete with a few cocci and bacilli. Histologically the human lesion showed marked hyperplasia of the epidermis and areas of acute, subacute and chronic inflammation. The spirochaete which is regarded as the cause of the infection is named *Spirochaeta noguchii.*

C. M. W.

CAFFREY (P. J.). **Relapsing Fever in Northern Nigeria, some Observations.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. June 17. Vol. 20. No. 3. pp. 195–197. With 1 chart.

The author describes his experiences with relapsing fever in the Sokotu Province. The outbreak followed very closely the advent of the dry, cool season when the average temperature was 70°–80° F., and the average humidity 50–60. A chart shows the mortality rate for twelve months and indicates a marked increase during the months when the rain was nil. The peak of the curve was in March. Amongst a population of 273,000 the excessive mortality rate of 53·4 per 1,000 was due entirely to this disease. All the evidence available pointed to the disease being louse-borne, spirochaetes being found in 4 out of 60 of these insects examined.

As regards symptomatology, in addition to the fever, marked signs of dyspnoea, jaundice and enlargement of the spleen occurred. The dyspnoea gave the impression of an approaching pneumonia. Jaundice was apparent on the second day of illness as a conjunctival tinge which gradually deepened to a definite staining by the sixth day. Old cases which had had one or more relapses sometimes showed well-marked jaundice. The spleen was enlarged and tender during the febrile period, but it was not possible to exclude concurrent malaria. In untreated cases the initial fever lasted for 6 to 8 days. After an apyrexial period a relapse occurred about the 13th to the 15th day. The relapse lasted 3 or 4 days and was often followed by irregular relapses during the next 2 months. Novarsenobillon in a dose of 0·3 gm. for children and twice this for an adult male caused early disappearance of the spirochaetes. Of 192 cases treated only 2, in moribund condition when seen, died. The mortality amongst un-

attended cases was 35 per cent. Stabilarsan intravenously gave satisfactory results, which, however, were not so good as those observed with novarsenobillon. Stovarsol by the mouth was less satisfactory.

C. M. W.

SAMSONOV (P. S.). **Persian Relapsing Fever in Central Asia.**—*Jl. Med. de l'Asie Centrale.* Tashkent. 1926. Vol. 5. No. 5. English summary p. 328. [In Russian pp. 249–264. With 9 text figs. 15 refs.]

The Persian type of relapsing fever which is associated with the presence of *Ornithodorus tholozani* occurs also in Central Asia. It is noted in Tadjikistan (the eastern part of the former Bokhara) by TROITSKY, in Zerafshan (the northern part of Bokhara) by KOROVNIKOV, and in Fergana and Tashkent by KONAHOV and the author. The disease is usually of a mild type characterized by numerous short relapses. The disease is alway sporadic and occurs amongst Europeans during July, August and September.

C. M. W.

ZAMORANO (A.). [La fiebre recurrente en la provincia de Toledo.] [**Relapsing Fever in Toledo.**]—*La Medicina Ibera.* 1926. Jan. 9. [Summarized in *Rev. Española de Med. y Cirug.* Barcelona. 1926. Mar. Vol. 9. No. 93. pp. 146–148.]

This is an analysis of six cases of relapsing fever in four of which there was a definite history of tick-bites 5–7 days previous to the onset. The remaining two patients did not recollect being actually bitten, but their occupation was to look after pigs whose styes were infested with ticks. The author is in favour of the view that the disease is primarily one of pigs because the tick transmitting the fever is a common parasite of the pig, and only exceptionally attacks man, while there exists among swine a disease called murrain (morriña), the course of which is very similar to that of relapsing fever in man. All the patients under the observation of the author recovered spontaneously.

H. Harold Scott.

MORIN (A.) & GENEVRAY (J.). Présence en Nouvelle-Calédonie de *Spirillum morsus muris* et de *Spirochaeta recurrentis.* [**Presence in New Caledonia of** *S. morsus muris* **and** *S. recurrentis.*]—*Bull. Soc. Path. Exot.* 1926. July 7. Vol. 19. No. 7. pp. 529–532. With 1 chart.

The paper describes a case of rat-bite fever in a child three years of age in which the spirillum was discovered by gland puncture and a febrile disease in a woman 40 years of age which was due to spirochaetes of the relapsing fever type. An interesting feature of the latter case is that the illness, which lasted seven days, was not followed by any relapse. As malaria does not occur in New Caledonia it is suggested that certain undiagnosed febrile conditions of intermittent form may be cases of relapsing fever. They sometimes occur in epidemics, and have been long known to local practitioners who have few facilities for making the necessary microscopic examinations.

C. M. W.

JOSEPH (A.). Untersuchungen ueber den Antagonismus parasitologischer Infektionen in der Immunitätsperiode. [**The Antagonism of Parasitic Infections in the Immunity Period.**]—*Klin. Woch.* 1926. Aug. 6. Vol. 5. No. 32. pp. 1466–1467. [1 ref.]

TRAUTMANN (*Ann. Inst. Pasteur* 1907. Vol. 21, pp. 808–24) and, later, DAELS (*Arch. f. Hyg.* 1910. Vol. 72, pp. 257–306) showed that there existed a certain antagonism between trypanosome and spirochaete infections as exemplified by the milder course of a nagana infection in animals suffering from experimental relapsing fever. It occurred to the author that the spirochaetes which persist in the brain after animals have recovered from a relapsing fever infection might be affected by a subsequent inoculation of trypanosomes. Accordingly a number of rats which had recovered from a spirochaetal infection were inoculated with nagana trypanosomes, and when this infection had developed they were cured by means of tartar emetic, which has no influence on the spirochaetes. It was found that when the brain substance was inoculated into fresh rats they became infected with spirochaetes, so that it was evident that the trypanosomes had not affected the brain spirochaetes. It was further shown that animals which had been cured of a trypanosome infection responded to relapsing fever in the usual manner. Whether the results are comparable with those obtained in the treatment of general paralysis with malaria seems doubtful, though by the operation of brain puncture FÖRSTER has demonstrated spirochaetes in the brain of general paralytics after treatment. In any case, it would seem that the superimposed infection does not directly influence the production of immune substances against the persisting organisms. There may be a non-specific stimulation of the depressed antibody producing mechanism or, as many maintain, a damage to the brain blood vessels which permits of the entry of immune substances or drugs.

C. M. W.

PRIGGE (R.). Ueber experimentelle Recurrensinfektion des Kaninchens. [**Experimental Relapsing Fever in the Rabbit.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1926. Sept. 11. Vol. 106. No. 3. pp. 552–555. With 1 text fig. [3 refs.]

Though it is known that injection of rabbits with the spirochaete of relapsing fever will give rise to a transitory infection associated with the development of immune bodies, no one appears to have succeeded in handing on the infection from rabbit to rabbit. The author has attempted to do this with four strains of spirochaetes—two Russian strains and two African strains, one of which was a so-called arsenic-resistant strain. The three first strains produced in a small percentage of animals a characteristic infection, but failed to do so in the majority, though the presence of spirochaetes could sometimes be demonstrated by inoculation of the blood into mice. With the arsenic-resistant strain, however, infections could be readily produced, by intravenous or intratesticular injection of mouse blood rich in spirochaetes. Immediately after intravenous injection spirochaetes could be found in the blood. Later they diminished in number, but a definite increase was noted in 24 hours. In two days as many as ten occurred in each microscopic field. There was no elevation of temperature but a certain number of rabbits died on the third day. The kidneys of these animals

showed an acute nephritis ; the urine in the bladder was of a dark brownish red colour due to haemoglobin, very few red blood corpuscles being present. In most cases spirochaetes disappeared from the blood in three days. This took place suddenly, in one animal numerous spirochaetes having been seen at one moment and none twenty minutes later. A similar course of events followed intratesticular injection. In no case was relapse noted, though the persistence of spirochaetes was demonstrated for as long as 12 days by the injection of blood or organs into mice. After recovery the rabbits had a definite immunity, the serum being rich in antibodies, as was easily demonstrated by protection experiments with mice. It was possible to hand on the infection from rabbit to rabbit, but the decrease in virulence of the strain resulted in only six direct passages being made. Subcutaneous injection produced no infection, but intracutaneous injection gave rise to a local swelling the fluid from which was infective to mice for 14 days. Such an infection was not followed by the appearance of spirochaetes in the blood nor was any immunity developed. The skin infection could not be handed on from animal to animal.

C. M. W.

PLAUT (F.). Untersuchungen über die Sonderstellung des Nervensystems zur Spirochäteninfektion. Rekurrensinfektion des Nervensystems bei dem als rekurrensimmun geltenden Kaninchen. [**Relapsing Fever Infection of the Nervous System in the Reputed-Immune Rabbit.**]—*Muench. Med. Woch.* 1926. Sept. 17. Vol. 73. No. 38. pp. 1552–1555. [11 refs.]

Rabbits, which are as a rule refractory to the usual methods of inoculation with relapsing fever spirochaetes, can be infected by sub-occipital injection. This leads to a primary localization of the spirochaetes in the brain and the development of meningitis. The organisms can be demonstrated in the cerebrospinal fluid and may pass into the blood. The infection, however, may be limited to the nervous system. If the organs (brain, liver, spleen, blood, cerebrospinal fluid) of such an animal are inoculated into mice only those animals inoculated with the brain become infected. If rabbits are inoculated intraperitoneally with the spirochaetes the organisms may enter the brain, and there remain without producing any change in the cerebrospinal fluid. In such cases the brain alone is infective to mice. It thus appears that, though the rabbit is naturally immune to relapsing fever, the brain does not participate in this immunity, and is excluded and separated from other organs in its behaviour towards relapsing fever infection.

C. M. W.

KRANTZ (Walther). Die Rieckenbergsche Reaktion bei experimentellem Mäuserekurrens. [**The Rieckenberg Reaction in Experimental Relapsing Fever in Mice.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1926. Vol. 48. No. 2–3. pp. 207–217. [6 refs.]

The paper describes experiments on the Rieckenberg reaction in the case of relapsing fever spirochaetes. BRUSSIN (this *Bulletin*, Vol. 23, p. 113) was the first to demonstrate that this reaction occurred in the case of these organisms, and the author has confirmed his results. He has found that under the action of the specific serum the platelets adhere to the spirochaetes only if they are still alive ; and that the

antibody is not developed by the injection of dead spirochaetes but only after an actual infection. The serum preserves its specific properties for a long time, so that there is a possibility of employing such a stock serum for controlling the constancy of the strain of spirochaete after many passages. A further point is that blood platelets from a normal animal may be employed as effectively as those from the infected animal, while it has been shown that bacteria behave in the same way as platelets. It becomes evident therefore that the specific serum renders the spirochaetes sticky, so that objects which are merely indicators easily adhere to them. . When once the adhesion has occurred, the reaction cannot be repeated with the same spirochaetes, though as regards their vitality they are uninfluenced by the specific serum. The serum which separates from blood allowed to coagulate is as active as the blood plasma.

C. M. W.

WIECHMANN (Ernst) & HORSTER (Hermann). Studien ueber experimentelle Infektionskrankheiten. I. Mitteilung. Ueber das Serumeiweissbild bei der experimentellen Rekurrensinfektion der Ratte. (Ausgeführt mit Unterstützung der Rockefeller Foundation.) [**The Serum Albumin in Experimental Relapsing Fever in Rats.**]—*Deut. Arch. f. Klin. Med.* 1926. June. Vol. 151. Nos. 5–6. pp. 285–292. With 1 curve. [21 refs.]

Having noted that at the crisis of a relapsing fever infection in rats the red blood corpuscles are agglutinated as well as the spirochaetes, it occurred to the author that this might be associated with a change in the albumin and globulin concentration of the blood. During the period between the inoculation and the appearance of spirochaetes in the blood there is a fall in the albumin concentration followed by a rise. Immediately before the crisis of an infection there is a fall in the albumin. As regards the globulin this is increased up to the crisis, a fall being noted on the first day after the infection. The maximum is reached about eight to twelve hours before agglutination of spirochaetes occurs. It seems probable that the two phenomena are correlated.

C. M. W.

STEINER (G.), HENNING & STEINFELD. Experimentelle Untersuchungen zur Pathologie und Therapie der Spirochätenkrankheiten. IV. Ueber das Verhalten der Recurrensspirochäten in der Haut des Normal- und des Immuntieres. [**The Behaviour of Relapsing Fever Spirochaetes in the Skin of Normal and Immune Animals.**]—*Klin. Woch.* 1926. Aug. 27. Vol. 5. No. 35. pp. 1599–1601. [3 refs.]

With a view to obtaining light on the wandering capacity of spirochaetes in the tissues of the skin, the authors removed pieces of skin from rats, inoculated relapsing fever spirochaetes into the interior of these pieces, and replaced them. Though granulation tissue formed at the site of the operation, the animals became infected, as proved by the appearance of spirochaetes in the blood. If immune rats were used, no such migration of the spirochaetes occurred.

C. M. W.

ARISTOWSKY (W.) & HOELTZER (R.). Ueber die Pathogenität unserer Kulturen der *Spiroch. Obermeieri.* [**Pathogenicity of Cultures of** *S. obermeieri.*]—*Klin. Woch.* 1926. Oct. 22. Vol. 5. No. 43. pp. 2024–2026.

The authors have already described their method of cultivating relapsing fever spirochaetes (this *Bulletin,* Vol. 22, p. 712). They now record certain experiments undertaken to test the pathogenicity of these cultures. It was found that the injection into mice of large doses would give rise to a mild infection which could not be handed on to other mice in series. An opportunity offered of testing the infectivity of cultures on general paralytics. Three cases were inoculated with a strain which had been maintained in culture since its isolation on March 18th, 1924. This was done at the beginning of 1926 with cultures which had been subcultured 296, 306 and 337 times. One case was inoculated with a strain isolated on November 25th, 1925, at its 29th subculture. All these became infected, the minimum dose being 0·2 cc. of a two days old culture.

C. M. W.

KROÓ (H.). Zur Frage der Persistenz der Spirochäten bei experimenteller Rekurrens. [**Persistence of Spirochaetes in Experimental Relapsing Fever.**]—*Deut. Med. Woch.* 1926. Aug. 13. Vol. 52. No. 33. pp. 1375–1376.

The author returns to the question of the persistence of spirochaetes in the brain of animals recovered from experimental relapsing fever infections. He shows that the brain may still harbour spirochaetes as long as 90 days after apparent recovery. No one has yet been able to demonstrate persistence of spirochaetes in the blood for such a period, though EHRLICH gave 30 days as the average time that blood remained infective to animals and the author notes an instance in which a relapse occurred with the appearance of spirochaetes in the blood after 50 days. It appears, therefore, justifiable to conclude that immunity to further infection lasts only so long as spirochaetes persist in the brain. Though PRIGGE maintains that the circulating blood must contain spirochaetes if they are present in the brain the evidence does not support this view. Eleven rats were treated with salvarsan for infection either before or after the crisis in such a way that during 37 days they received at 4-day intervals 10 injections of the drug. Four weeks after the last dose the animals were bled and the brain of each injected into three and the blood into two mice. After an incubation period of three to four days six of the brain-injected mice were infected while all the others remained free. The author thinks there is justification for the view that the brain acts separately from the rest of the body as regards the infection, immunity and chemotherapeutic biology of relapsing fever.

C. M. W.

SCHREUS (H. Th.) & WEISBECKER (H.). Zur Frage der sterilisierenden Wirkung von Salvarsan auf die Rekurrensinfektion der Maus. [**The Sterilizing Action of Salvarsan on Relapsing Fever in Mice.**]—*Deut. Med. Woch.* 1926. Nov. 5. Vol. 52. No. 45. pp. 1902–1903. [6 refs.]

Clinical experience in the treatment of syphilis has shown that the result varies between a complete cure, when reinfection is possible, and absolute resistance to salvarsan. Experiments made by BUSCHKE

and Kroó and others have shown that relapsing fever mice when treated with salvarsan and apparently cured may still harbour spirochaetes in the brain. The authors decided to investigate the persistence of spirochaetes in the brain and other organs after varying doses of salvarsan, as it appeared that this might throw light on the treatment of syphilis. Accordingly the following procedure was adopted. On the second day of a relapsing fever infection mice were given a dose of silver salvarsan and after 6 or 7 days some of them were killed and inoculations of the brain, liver, aorta and blood were made into other mice. These were observed for 20 days and, whether the blood had shown spirochaetes or not, they were then reinoculated, together with the treated mice which had not been killed and which acted as controls, with relapsing fever virus to test their immunity. The results were as follows. With a dose of 1 cc. of a 1 in 500 solution the brain, liver, aorta and blood were infective to mice which on reinoculation after 20 days were all immune. With a dose of 1·25 cc. the brain and liver alone produced a recognizable infection, but all the reinoculated mice remained uninfected, even those which had shown no infection after inoculation from the blood and aorta of the treated mice. When the dose was increased to 1·5 cc. the brain alone produced infection in the inoculated mice, which on reinoculation became infected in the case of those which had been inoculated from the aorta and blood, but not in the case of those inoculated from the brain and liver. The experiment repeated with a dose of 1·5 cc. and 2 cc. showed that all the organs were sterile while on reinoculation all the mice became infected. The control mice reinoculated after treatment did not become infected except in the case of those which had received the highest dose of 2 cc., an indication that a complete sterilization had occurred and consequently no immunity. The experiments indicate that as the dosage is increased the spirochaetes are eradicated from more organs till finally they are extirpated even from the brain and when such a complete clearing of the system has occurred reinfection is possible.

C. M. W.

Johannessohn (Fritz). Recurrensspirochäten und Salvarsan. [**Relapsing Fever Spirochaetes and Salvarsan.**]—*Med. Klin.* 1926. Oct. 15. Vol. 22. No. 42 (1140). p. 1614. [4 refs.]

Buschke and Kroó stated that when mice were treated for experimental relapsing fever infection with salvarsan though the spirochaetes disappeared from the blood they could be demonstrated in the brain by inoculation of its substance into mice. It did not appear to the author that the statements regarding disappearance from the blood were justified, as the blood had not been tested by inoculation into mice. The author has reinvestigated the question and has inoculated into mice both the blood and brain tissues of the treated animals. He arrives at the following conclusions.

1. If mice are treated with full therapeutic doses of neosalvarsan (3·5 mgm.) immediately after infection occurs there is complete sterilization of both the blood and brain.
2. If treatment is delayed so that spirochaetes have had time to become distributed throughout the body then treatment will sterilize the blood but not the brain.
3. The spirochaetes which persist in the brain are not salvarsan-fast.

C. M. W.

KRANTZ (Walther). Die Sanocrysinwirkung bei Mäuserecurrens. [**Sanocrysin in Relapsing Fever in Mice.**]—*Klin. Woch.* 1926. Sept. 24. Vol. 5. No. 39. p. 1831.

Experiments on the action of sanocrysin on experimental relapsing fever in mice has revealed the fact that it is very similar to that of salvarsan. If a mouse at the early stage of its infection is given a dose (0·0005 to 0·001 gram) of the drug the spirochaetes disappear from the blood, the attack is cut short and relapses do not appear. As in the case of salvarsan, there is no apparent immediate action on the spirochaetes, the disappearance commencing only after some hours. Nevertheless, by inoculation of animals with the spirochaetes taken from the treated animal during the latent period it is found that they have been profoundly altered, the produced infection diminishing in intensity and the incubation period lengthening with approach to the time of disappearance of the organisms. Spirochaetes taken from the animal just before the disappearance crisis commences may fail to produce infection. As regards its prophylactic action, mice inoculated ten minutes after a dose of 0·001 gram of the drug has been given are not protected against infection, though this dose is sufficient to cure an already existing infection. If an hour is allowed to elapse then the resulting infection is less intense, but with an interval of 24 hours no protective action could be detected. As the author remarks, it is of considerable interest that two such different substances as sanocrysin and salvarsan should be so similar in their chemotherapeutic properties.

C. M. W.

VINZENT (René). Sur un spirochète de la souris blanche pathogène pour l'homme. [**A Spirochaete of the White Mouse Pathogenic to Man.**]—*C.R. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 286–288.

During the course of therapeutic investigations in France with a strain of *Trypanosoma somaliense* in mice, it was noted that in one white mouse a spirochaete of the relapsing fever type had appeared. By keeping blood serum for 2 or 3 days or crushed spleen on ice for 24 hours it was found that the trypanosomes died off and a pure strain of the spirochaete was obtained. This was readily inoculable to mice and young rats, but not to adult rats, guineapigs, rabbits or fowls. The spirochaetes appeared in the blood in 3 days and reached a maximum development on the 6th day, after which they disappeared to return from time to time finally vanishing at about the 21st day. The organism was inoculated to a human being in the last stages of general paralysis. It appeared in the blood in 6 days and remained there for 72 hours, after which it disappeared. Reference is made to LEGER's discovery of *Spirochaeta crocidurae* in the shrew and rat, and to an observation of SAVINI (this *Bulletin*, Vol. 20, p. 701) who, during the course of passage of a strain of *Trypanosoma brucei* through a series of white mice, had noted the spontaneous appearance of a similar spirochaete which he named *Spirochaeta naganophila*. SAVINI did not, however, subinoculate the organism. In the case of the organism met with by the author the presence of the spirochaete influenced the course of the trypanosome infection in that the death of the animals was considerably retarded.

C. M. W.

MATHIS (Constant). Virulence pour l'homme du spirochète de la musaraigne. [**Virulence for Man of the Shrew Spirochaete.**—*C. R. Acad. Sci.* 1926. Oct. 4. Vol. 183. No. 14. pp. 574–576.

In 1917 LEGER discovered in the Senegal shrew a spirochaete, *S. crocidurae*, which resembled that of relapsing fever, and it was suggested that the animal might prove to be a reservoir for the human virus. LEGER attempted to infect two human beings by inoculation of blood from infected animals, but though fever was induced, no spirochaetes could be discovered in the blood. The present writer has similarly inoculated two general paralytics in France with blood from mice which had been infected with *S. crocidurae* brought from Dakar in young rabbits. In both cases an infection of an irregular relapsing fever type was induced, but spirochaetes were never demonstrable by direct blood examination. They were, however, recovered by inoculation of mice at various stages of the illness when fever was present. It has thus been demonstrated that a naturally occurring spirochaetosis of animals is capable of transmission to man. Whether this is an indication that the rodents are reservoirs of a human relapsing fever virus, or of a virus which may at some future date lead to human infection, cannot be decided without further work. It is, however, worthy of note that there occur in West Africa, and especially in Senegal, certain febrile conditions of unknown etiology and in which the most careful blood examinations have yielded only negative results. It is possible that animal inoculations might reveal a hitherto undetected spirochaetosis.

C. M. W.

MATHIS (C.) & GALLOWAY (I. A.). Culture *in vitro* du spirochète de la musaraigne. [**Cultivation of the Shrew Spirochaete.** *C. R. Soc. Biol.* 1926. Oct. 22. Vol. 95. No. 29. pp. 978–979. [5 refs.]

By the culture method elaborated by one of the authors (this *Bulletin*, Vol. 23, p. 111) *Spirochaete crocidurae* has been successfully cultivated and carried through a number of subcultures. Animals were infected with a sixth passage culture on the 12th day of growth. The behaviour of the organism in the culture medium still further emphasizes its resemblance to the spirochaetes of relapsing fever.

C. M. W.

COLES (Alfred C.). **Leptospira : Methods of Examination : New Habitat of Free-Living Forms.** *Jl. Trop. Med. & Hyg.* 1926. June 15. Vol. 29. No. 12. pp. 170–176. [16 refs.]

In this paper the author describes in detail his methods of examination of water and other material for leptospira and the results he has obtained. His long experience has enabled him to evolve a technique which gives him uniformly satisfactory results which demonstrate that in expert hands comparatively simple apparatus, such as the oil lamp, may be employed to reveal the finest structure of these minute and delicate organisms. In a review it is impossible to mention the numerous details to which attention must be paid if good results are to be obtained. One of the most important points is the use o

absolutely clean slides, to obtain which a pot of paste made with whiting (pulv. creta prep.) and water is kept. This is rubbed on the slide, which is then polished with a clean cloth. With such grease-proof slides exceedingly thin films of water or other material can be made. Liquid on such slides can be conveniently examined with a dry lens system, without a cover glass. The organisms in dry films are stained by Giemsa stain or a modified Fontana stain (described in the paper) or they are shown in relief by the use of a strong or saturated solution of nigrosin in place of indian ink. Leptospira have been demonstrated in water, material from decaying leaves and the kidneys of rats and dogs, the last-named having succumbed to infectious jaundice. As regards the minute structure the author states that the leptospira, in common with nearly all spirochaetes, have at one or both ends long flagellum-like structures. In the case of *S. buccalis* not only are the end flagella present, but also a number of short delicate cilium-like projections along both sides, so that the whole spirochaete has somewhat the appearance of a miniature centipede. Whether other observers will agree with all the statements or not, there can be no doubt that the claims made are the result of painstaking researches. The whole paper is one which well repays a careful study.

C. M. W.

DELAMARE (G.) & ACHITOUV. Indices de courbure et coefficients d'homogénéité des spirochètes fécaux. **Curves and Coefficients of Faecal and Bronchial Spirochaetes.**—*C. R. Soc. Biol.* 1926. June 18. Vol. 95. No. 21. pp. 63–65. With 4 text figs.

—— & ——. Indices de courbure et coefficients d'homogénéité des spirochètes bronchiques.—*Ibid.* pp. 65–67. With 2 text figs.

By a careful measurement of intestinal spirochaetes with special reference to the height and length of the curves, which were plotted in various ways on charts, it appears to the authors that there are two types, the one (*buccalis-eurygyrata*) with open spirals, and the other (*dentium-stenogyrata*) with close spirals. The method adopted demonstrates the identity of the spirals of the first type with those of *Spirochaeta buccalis*, without, however, demonstrating that *ipso facto* the two species are identical.

Applying the same method to the spirochaetes of the bronchi, it is concluded that the morphological index of FROILANO DE MELLO cannot be used as an argument against the view that the broncho-pulmonary spirochaetes are of the type of those associated with fusiform bacilli or as establishing the autonomy of *Spirochaeta bronchialis*.

C. M. W.

CASTELLANI (Aldo). **Broncho-Spirochaetosis.**—*Jl. Trop. Med. & Hyg.* 1926. Nov. 1. Vol. 29. No. 21. pp. 360–367. With 5 text figs. [94 refs.]

This paper is a general description of broncho-spirochaetosis and gives a clear account of the author's views on the subject. The name is said to cover, *sensu lato*, "all bronchial and broncho-pulmonary conditions associated with the presence of a large number of spirochaetes in the sputum, which are, in all probability, the causative

agents." As regards the spirochaetes, the author says that they may be of very different morphological appearances and he gives a classification of the types which may be found. These are regarded as belonging to the genus *Spirochaeta sensu stricto*, the members of which present a few spirals or coils of different sizes or to the genus *Treponema* in which they have numerous small equal undulations close together. In the first group are included very delicate organisms, such as *Spirochaeta bronchialis* and *minuta* and coarser ones, like *S. buccalis*, *S. vincenti*, etc. In the second group are *Treponema pallidum*, the cases harbouring which give a positive Wassermann reaction, and other members of this genus associated with which the Wassermann reaction is negative.

It is noted that the spirochaetes seldom occur alone, accompanying streptococci, pneumococci, fusiform bacilli and an organism termed by the author and CHALMERS "macro-vibrio" being found associated with them. The types of the disease are acute broncho-spirochaetosis and chronic broncho-spirochaetosis, the latter divisible into; (1) type with muco-haemorrhagic or muco-purulent haemorrhagic sputum; (2) type with purulent expectoration; (3) type with putrid expectoration. As a modification of the chronic type is the asthmatic type, the symptoms being those of chronic bronchitis with occasional attacks of typical asthma. Cases of mixed infections with tuberculosis or bronchomycosis also occur. Two typical cases of the disease are described in detail, as also the appearance of the lungs as seen at the autopsies of three cases of the purulent type. There was a patchy consolidation of both lungs, and in two of the cases there were several small foci of necrosis. The mucosa of the bronchi was swollen and injected and some of the peribronchial glands were enlarged. In suitably stained sections large numbers of spirochaetes were seen, but it is noted that other organisms were also present. Diagnosis rests upon the discovery of the spirochaete in the fresh sputum. Prognosis is said to be good except in the severe putrid and purulent types, but the disease runs a chronic course, and although periods of great improvement may take place, a true spontaneous cure is exceedingly rare. Three drugs, viz., arsenic, tartar emetic and potassium iodide, have been found useful.

The paper can be regarded as a summary of the present knowledge of the condition broncho-spirochaetosis. It is evident that it is regarded as resulting from infection not only with the organism referred to as *Spirochaeta bronchialis*, but other allied spirochaetes also, some at any rate of which are common inhabitants of the mouth. Under prophylaxis it is stated that mouth hygiene is of importance, as some of the spirochaetes causing the condition are probably always present in the mouth. On commencing to read this paper by the one who had originally described the condition there was a hope that some convincing evidence of the actual pathogenicity of the organisms regarded as causing the disease would be found. But these hopes have not been realized, for the presence of spirochaetes, admittedly of various types, and frequently associated with other bacteria, some of which are known to be harmful, is still the only evidence of their pathogenicity. It does not seem to the reviewer that the problems of etiology will ever reach solution if there exists this continued neglect of the scientific postulates first clearly enunciated by KOCH, which still remain the only certain criteria upon which organisms can be judged to be pathogenic and the cause of any particular disease condition.

C. M. W.

PEYROT (J.). Quelques considérations sur la bronchite de Castellani. Infection générale et son traitement. **Castellani's Bronchitis. General Infection and its Treatment.**—*Rev. Prat. Malad. des Pays Chauds.* 1926. Apr. Year 5. Vol. 6. No. 2. pp. 53–91. [24 refs.]

The paper is a long argument in favour of the recognition of bronchial spirochaetosis as a distinct disease. It is based on the author's experience of over forty cases, twenty-four of which occurred in epidemic form during the cold period at the beginning of 1924, as a result of admission to hospital of an infected individual. The initial symptoms of these cases were carefully studied and are described in detail. They appear to be very similar, if not identical in most instances, with those of coryza of varying intensity. Though almost every conceivable pathological condition of the air passages and lungs has already been attributed to the bronchial spirochaetes, these do not complete the morbid conditions for which these organisms are responsible, for the author now notes that other organs may be affected. The liver is described as being tender and hypertrophied, the intestines are irritated so that diarrhoea results, there is a sub-icteric tinting of the conjunctivae, the urine gives the reaction of Hay, the skin shows a generalized eruption, haematuria associated with the presence of spirochaetes in the urine may supervene, the nervous system is involved, so that a condition of depression associated with obsessions and severe frontal headache supervenes, there is swelling and pain in the joints. Such an array of symptoms indicates, as the author says, that bronchial spirochaetosis is not such a mild disease as many observers imagine and demands the careful consideration of the physician. In the treatment of his cases the author has found no specific remedy, the medicaments which have cured one case failing entirely to influence another. He is inclined to admit that the spirochaetes and fusiform bacilli from the bronchi may be identical with those of Vincent's angina, but he is emphatic in his conclusion that in these spirochaetes is to be found the etiological factor of the world-wide morbid conditions he and others have described. It is evident that the symptoms associated with this so-called infection are by no means exhausted, and the trend of the literature on the subject is such that we may confidently expect that many more pathological conditions of the human body will be ascribed to these easily discovered spirochaetes. Unfortunately, there is a missing link in the chain of evidence—the proof that the spirochaetes are responsible for the conditions attributed to them has not been obtained.

C. M. W.

JOHNSON (W. B.). **Notes upon Bronchial Spirochaetosis in the Northern Provinces of Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 100–103.

With a view to estimating the prevalence of bronchial spirochaetosis in Nigeria the sputa of patients attending the Native Hospital at Kaduna were examined. This revealed the presence of spirochaetes in a large proportion of those examined. A difficulty encountered in making a diagnosis of bronchial spirochaetosis was that spirochaetes were found in all cases of acute respiratory disease admitted to hospital. Cases of acute bronchitis, pneumonia, pleurisy, asthma and pulmonary

tuberculosis which showed spirochaetes in the sputum followed the normal courses of these diseases. The cases of acute bronchitis might readily be diagnosed as acute bronchial spirochaetosis were they not compared with other acute respiratory diseases showing spirochaetes in the sputum. Of 147 sputa examined 107 showed the presence of spirochaetes. It is nevertheless concluded that these organisms may become pathogenic and cause a chronic tracheitis and bronchitis associated with cough and wasting and giving rise to a condition which might readily be mistaken for pulmonary tuberculosis.

C. M. W.

HUIZENGA (L. S.). **Broncho-Spirochaetosis.**—*China Med. Jl.* 1926. July. Vol. 40. No. 7. pp. 658–660. With 1 text fig.

The author states that bronchial spirochaetosis as a distinct disease entity occurs commonly along the lower Yangtse river. As tuberculosis is also common in this locality the two diseases often occur together. The same remark applies to leprosy. Acute cases which run a febrile course are very liable to become chronic if untreated. The chronic uncomplicated cases suffer little disturbance apart from the cough, which is invariably worse in the spring time. To intravenous arsenic treatment most cases respond.

C. M. W.

DELAMARE (G.). Sur la distribution géographique des spirochétoses respiratoires, d'après quelques travaux récents. [**The Geographical Distribution of the Respiratory Spirochaetes.**] *Bull. Soc. Path. Exot.* 1926. May 12. Vol. 19. No. 5. pp. 322–325.

Recent contributions to the subject of bronchial spirochaetosis, though they may be interpreted as indicating the importance of the pathogenicity of the bronchial spirochaetes or the final abandonment of the view that they are pathogenic, or the importance of exercising caution when a diagnosis of bronchial spirochaetosis is made, do at least indicate that *Spirochaeta bronchialis* is ubiquitous, and that it is impossible to differentiate it from *S. vincenti*.

C. M. W.

LESSLAR (J. E.) & KANAGARAYER (K.). **Three Cases of Bronchial Spirochaetosis.**—*Indian Med. Gaz.* 1926. Sept. Vol. 61. No. 9. pp. 447–448. [3 refs.]

The three cases described showed spirochaetes and fusiform bacilli in their sputa.

C. M. W.

BERNASCONI (Vicente E.). Primer caso de fiebre recurrente autóctono diagnosticado en Jujuy. [**First Case of Relapsing Fever diagnosed in N. Argentina.**] *Bol. Inst. Clin. Quirurg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 74–76. With 1 coloured plate & 1 chart.

The paper gives an account of a case of typical relapsing fever which occurred in Jujuy, Northern Argentine. A coloured plate depicts the spirochaetes found in the blood.

C. M. W.

## RAT-BITE FEVER.

SOLOMON (H. C.), BERK (A.), THEILER (M.) & CLAY (C. L.). **The Use of Sodoku in the Treatment of General Paralysis. A Preliminary Report.**—*Arch. Intern. Med.* 1926. Sept. 15. Vol. 38. No. 3. pp. 391–404. With 3 charts in text. [15 refs.]

The spirillum of rat-bite fever being an organism which produces a relapsing type of fever in man and one which is easily maintained in laboratory animals, it occurred to the authors that an intentionally-produced infection might be of value in the treatment of general paralysis either in place of the parasite of malaria or in addition to it. In the first place, the infectivity of the animal-maintained strain had to be demonstrated. Accordingly 3 general paralytics were inoculated intradermally in the thigh. In the course of 3 to 5 days redness and swelling occurred at the site of inoculation and there developed a chancre-like sore. The lymphatics became reddened and moderately tender, while the inguinal glands were tender and enlarged. About three days after the development of the sore attacks of fever occurred, the temperature rising to 102 to 104° or 105° F. It remained elevated for a few hours or a couple of days and then descended. Subsequently, rises occurred at intervals varying from a day to 3 or 4 days. A number of attacks occurred during a period of weeks, after which the fever ceased spontaneously or as a result of arsphenamine treatment. During the fever the lymph glands in various parts of the body became enlarged and at the same time skin lesions appeared. The disease was easily controlled by one or more injections of arsphenamine. With the object of avoiding the primary skin lesion which follows intradermic inoculation 8 patients were inoculated intravenously with infected rat or guineapig blood (from 0·1 to 1 cc.). It was found that infection took place and that if care was exercised not to contaminate the skin the primary skin lesion was avoided. At the end of one to three weeks fever occurred. Later, skin manifestations appeared, while at times there was a generalized glandular enlargement. Two cases were infected after they had been subjected to malaria treatment, while in one patient malaria was successfully inoculated after infection with the rat-bite fever organism. It is evident, therefore, that the rat-bite fever virus can be successfully inoculated before or after malaria. Even when animals inoculated from the cases failed to acquire an infection, as is not infrequently the case, it could be recognized that infection had occurred by the development of antibodies in the blood as tested against the living organism from experimental animals. The serum very rapidly caused cessation of movement and lysis of the spirilla. As regards the results of treating general paralytics by the method outlined above the authors are very guarded in their statements but feel that they are justified in claiming that clinical and serological improvement has taken place in some of them. They wish to call attention to the possibilities of the method in producing fever which can be used under circumstances similar to those in which the malaria or relapsing fever methods have been advocated.

C. M. Wenyon.

i. HERZFELD (Gertrude M. A.) & MACKIE (T. J.). **An Investigation of a Case of Rat-Bite Fever.** *Edinburgh Med. Jl.* 1926. Oct. Vol. 33. No. 10. pp. 606–619. With 6 text figs. [16 refs.]

ii. MACKIE (T. J.) & MCDERMOTT (E. N.) **Bacteriological and Experimental Observations on a Case of Rat-Bite Fever**: *Spirillum minus.* — *Jl. Path. & Bact.* 1926. Oct. Vol. 29. No. 4. pp. 493–495. [8 refs.]

i. The paper describes a typical case of rat-bite fever seen at Edinburgh in a child of five years, which is of special interest in that blood culture yielded an organism with some resemblance to that described by BLAKE as *Streptothrix muris ratti*, and which he supposed to be the cause of the disease [this *Bulletin*, Vol. 7, p. 160]. In addition to this organism, *Spirillum minus* after many futile efforts was found in smears of an enlarged gland, and was successfully inoculated to guineapigs. As regards the organism isolated by culture in biological characters it corresponded generally with *Bacillus faecalis alkaligenes*. In cultures incubated for several days there was some resemblance to BLAKE's organism, which, however, was non-motile. It is suggested that the branching described by BLAKE may have been a false branching, and his microphotographs bear this out. Furthermore, the biological characters of BLAKE's organism do not appear to correspond with those of the group recognized as streptothrices, so that its classification as a streptothrix seems hardly justified. The organism isolated from the blood in the case described was agglutinated by the patient's serum in dilutions which indicated a rise in titre with the progress of the disease. The end-titre was 1 in 1,280. It is concluded that the organism represented a secondary blood infection in the case. The spirillum isolated from the gland corresponded with *Spirillum minus*, and a cure was effected by injection of novarsenobillon.

ii. The strain of *Spirillum minus* was handed on to rats, mice and other guineapigs, but failed to infect rabbits. In the guineapig the infection proved fatal. The two guineapigs inoculated from the gland tissues showed spirilla in the blood in 19 and 37 days, and died in 63 and 127 days. The virulence was increased by subinoculation. The guineapigs developed a progressive illness with irregular intermittent pyrexia, marked emaciation and persistence of blood infection. At a certain stage conjunctivitis and keratitis developed and spirilla occurred in the discharge. This condition reached a maximum and then passed off.

C. M. W.

DEMBO (Leon H.), RUH (H. O.), FARGO (Warren C.) & TAYLOR (George R.). **Rat Bite Fever. A Clinical Review with Report of a Case.** — *Amer. Jl. Dis. Children.* 1925. Feb. Vol. 29. No. 2. pp. 182–190. With 1 chart in text. [24 refs.]

A description of a case of rat-bite fever in a child seven months old. The causative organism was discovered in serum obtained from the bitten region of the thumb. A review of the literature shows that a comparatively small number of cases have been described in America during the past ten years. The clinical condition appears to have been first recognized in America by WILCOX in 1840 (*Amer. Jl. Med. Sci.* Vol. 26, p. 245).

C. M. W.

SOESILO (R.). Het voorkomen van *Spirillum minus* var. *morsus muris*, verwekker van de rattebeetziekte, bij ratten van Batavia. [**On the Occurrence of *Spirillum minus* var. *morsus muris*, the Cause of Rat-Bite Disease, in Rats found in Batavia.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 4. pp. 522–530. With 1 plate. [17 refs.]

The author, who became acquainted with the technique of the investigation of the causative agent of sodoku in SCHÜFFNER'S laboratory in Amsterdam, applied this knowledge when returning to Java in the search for infected rats in Batavia. Out of 10 *Rattus norvegicus* and 20 *R. rattus*, one of the latter was found infected. He succeeded in transmitting the organism (found in the blood) to white mice and guineapigs. He describes the technique used and the morphology of the organism and confirms the results of previous researches.

N. H. Swellengrebel.

RUYS (A. Ch.). [De verwekker der rattebeetziekte.] [**The Agent of Rat-Bite Fever.**]—Thèse Amsterdam. 1925. [Summarized in *Bull. Inst. Pasteur.* 1926. May 31. Vol. 24. No. 10. pp. 450–451.]

A spirillum resembling that of rat-bite fever was found in the blood of 3 out of 250 rats examined in Amsterdam. They were not found in the saliva. A similar organism was found in mice. Though the organism found in rats and in rat-bite fever is morphologically identical with that in mice the two are regarded as distinct because the former is pathogenic to guineapigs and monkeys, while the latter is not pathogenic to guineapigs. The mouse organism is easily inoculated from mouse to mouse, but does not give rise to any symptoms ; it produces only an abortive infection in rats. The rat strain is as easily inoculated to mice. Guineapigs can be infected by subcutaneous and intraperitoneal inoculation and also by the bites of rats. In the case of bites there is swelling of the bitten limb, glandular enlargement, fever, alopecia and conjunctivitis or keratitis. A wild rat bitten by an infected rat also acquired an infection. The blood of a monkey infected by subcutaneous inoculation was still infectious to mice after 10 days. Rabbits did not respond to inoculation. The strain from an English case of rat-bite fever was pathogenic to the guineapig and monkey and produced in them the same symptoms as the rat strain. On several occasions workers in the laboratory were bitten by mice infected with the three strains without developing any symptoms.

C. M. W.

ABE (M.). **On the Reinoculation of Rat-Bite Disease in Rabbits.**—*Japan. Jl. Dermat. & Urol.* 1926. May, June. Vol. 26. No. 5, 6. English summary pp. 37–38. [In Japanese pp. 510–513.]

Rabbits, which invariably become infected after inoculation with the organism of rat-bite fever, were inoculated intracutaneously and at varying intervals were similarly reinoculated at some other part of the body. It was noted that the probability of the second inoculation producing a lesion was lessened as the interval between the two inoculations was increased. The interval was lowest in those cases in which the primary inoculation produced a marked inflammatory lesion, and as the intensity of the primary lesion varied with the site chosen the interval was dependent on this factor also. In only one of 55 rabbits reinoculated after complete disappearance of the primary lesions was a lesion produced.

C. M. W.

BRODIN (P.) & DE LA RIVIÈRE (Dujaric). Septicémie à virus filtrante consécutive à une morsure de rat, guérie par un abcès de fixation.—[**A Filtrable Virus Septicaemia following a Rat Bite.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1926. June 17. 3rd Ser. Year 42. Vol. 50. No. 21. pp. 985–991. With 2 charts in text.

The authors describe what they regard as an entirely new disease condition resulting from the bite of a white rat which had had been bred in the house. The illness, which ran a course of over two months, commenced three days after the bite, and was not associated with any change in the primary lesion, which had healed completely. The condition was a very severe one, and was characterized by continued but irregular fever, very severe generalized arthritis, acute pharyngitis and laryngitis and a peculiar skin eruption of a papular type, which broke out on the forearms, hands, legs and feet. Appropriate treatments for rheumatic, spirochaetal, intestinal and blood infections were tried without avail. Finally a fixation abscess induced by an injection of turpentine is stated to have brought the illness to an abrupt conclusion. Numerous laboratory examinations were made, but these failed to assist in the diagnosis. It was, however, observed that the serum of the patient passed through a Chamberland L 2 filter produced a fatal infection of a septicaemic type in mice and guineapigs. Cultures were made from the blood, and though no recognizable organisms appeared, subcultures were made and were proved by animal inoculations still to contain the virus. The filtered culture fluids were likewise lethal to animals, so that the authors conclude that they were dealing with a condition caused by a hitherto unrecognized filterable virus.

C. M. W.

SINCLAIR (T. W.). **Probable Case of Rat Bite Fever.**—*Med. Jl. Australia.* 1926. July 24. 13th Year. Vol. 2. No. 4. pp. 111–112.

The case described is that of a man aged 37 who developed fever, glandular swelling and a cutaneous eruption after having been bitten by a rat. As a single dose of novarsenobillon cured the patient the condition is supposed to be rat-bite fever.

C. M. W.

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MARZINOWSKI (E. I.), PIROGOW (A. W.) & MOSCHKOWSKI (Sch. D.). Ein Fall von Rattenbisskrankheit (Sodoku).—*Russian Jl. Trop. Med.* 1926. No. 1. German summary p. 27. [In Russian pp. 3–8. With 1 text fig. 11 refs.]

## INFECTIOUS JAUNDICE.

WHITEHEAD (N. T.) & CROUCH (H. A.). **Infectious Jaundice in the Sudan.**—*Jl. Trop. Med. & Hyg.* 1926. Nov. 1. Vol. 29. No. 21. pp. 359–360.

The paper describes three separate outbreaks of infectious jaundice which occurred in the Sudan during the years 1922–1925. They bore no relation to one another, and did not conform to any one type of the disease. The Port Sudan epidemic comprised 47 cases and occurred during the first three months of 1922. The chief symptoms were jaundice, headache, epigastric pain, some vomiting after food and slight fever for a day or two. In most cases the urine was examined and

was found to be free from albumin. The jaundice disappeared in 5 or 6 days, while the average stay in hospital was 4 days. There appeared to be no debility during convalescence. As men alone suffered from the condition it was evidently not a family disease, and it seemed possible that infection occurred in the market place where the native males congregated daily to take their meals. Laboratory work, including blood culture and inoculation of guineapigs with blood and the deposit from centrifuged urine did not assist in clearing up the diagnosis. In the deposit of the urine of one case spirochaetes were seen, but these did not infect guineapigs. Clinically, there was a resemblance to cases of camp jaundice. The mildness of the attacks, absence of haemorrhagic symptoms, liver enlargement and albuminuria, and lack of pathogenicity of the urine deposit to guineapigs differentiated the disease from infectious jaundice.

The second outbreak occurred in Kassala in February and March, 1924, and affected 10 men of a party of 40 Berberines and a British inspector who lived under canvas by the railway upon which they were working. Laboratory work was not undertaken, but clinically the cases resembled those of the first outbreak. The third epidemic concerned 5 cases which were noted during March to May, 1925, in Malakal. They were quite unconnected with one another, but the symptoms were more severe than in the other two outbreaks. The liver was enlarged, while albumin occurred in traces in the urine of three of the cases. Two developed bronchitis and one cardiac enlargement which proved fatal.

C. M. Wenyon.

BARKER (F. A.). **Leptospirosis. With Special Reference to the Existence of** *Spirochaetosis icterohaemorrhagica,* **or Weil's Disease, in the Andaman Islands.**—*Indian Med. Gaz.* 1926. Oct. Vol. 61. No.10. pp. 479–488. With 8 charts & 1 map. [31 refs.]

This paper, being an M.D. thesis on the subject of leptospira infections, commences by giving a summary of present knowledge regarding the diseases produced by these organisms, and then continues with a discussion of the possibility of the existence of Weil's disease in India. It is not known whether the disease actually occurs in India, though several small epidemics of a suspiciously similar disease have been reported from time to time. This is particularly true of the Andaman Islands, and special attention is paid by the author to the outbreaks of infectious jaundice in this locality. So far, however, the leptospira has not been isolated from the cases, so that though there is every probability that the disease will ultimately prove to be Weil's disease, it has not yet been demonstrated. There is evidently a wide field for enquiry in the Andamans and the rest of India.

C. M. W.

VAN GELDER (A. H.). Nog eenige gevallen van de ziekte van Weil. [**Some more Cases of Weil's Disease.**]—*Nederl. Tijdschr. v. Geneesk.* 1926. July 31. 70th Year. 2nd Half. No. 5. pp. 524–532. With 3 text figs.

During the summer of 1925 the author observed a small epidemic of 8 cases of Weil's disease in the town of Delft (Province of South Holland). They were of medium severity and mild ones; no death occurred. Four of the cases showed the usual clinical symptoms.

The four others were only recognized in connexion with other indubitable cases. In all the diagnosis was confirmed by the agglutination and lysis of leptospira by the patient's serum in a dilution of 1 : 1,000 or more. Only once leptospira were found (in the urine).

N. H. Swellengrebel.

CREYX & BONNEL. Remarques sur l'ictère infectieux. [**Remarks on Infectious Jaundice.**—*C.R. Soc. Biol.* 1926. May 28. Vol. 94. No. 18. pp. 1287–1288.

In describing a case of febrile jaundice of a relapsing type the author calls attention to the present tendency to regard all such cases as of the nature of infectious jaundice if a positive serological reaction is obtained with the leptospira of Weil's disease. This is true even of cases in which blood culture has revealed organisms of the typhoid group. The case in point was negative to all tests but the serological one, and the remark is made that from the point of view of etiology the diagnosis was based on the single laboratory reaction, namely, the agglutination of *Spirochaeta icterohaemorrhagiae* by the patient's serum.

C. M. W.

UHLENHUTH & GROSSMANN (H.). Die Ätiologie und Epidemiologie der ansteckenden Gelbsucht (Weilschen Krankheit) im Lichte experimenteller Untersuchungen ueber die Typenfrage ihres Erregers (*Spirochaeta icterogenes*). [**Aetiology and Epidemiology of Infectious Jaundice. Experimental Researches on the Type of the Spirochaete.**] —*Klin. Woch.* 1926. June 18 & 25. Vol. 5. Nos. 25 & 26. pp. 1113–1117. [1 ref.]; 1163–1166.

In these papers the authors discuss the etiology of Weil's disease, reviewing all known facts regarding the incidence of the disease in man and the experimental data obtained in the laboratory. It is noted that the human disease is always localized and is generally connected in some way with polluted waters. The infection in rats, however, is world-wide in its distribution. It is known that organisms indistinguishable from those isolated from human beings and rats occur in water and that occasionally they have been found to produce in guineapigs inoculated experimentally symptoms like those caused by the Weil's disease organism. It is accordingly suggested that there exist in water two distinct though morphologically indistinguishable organisms, the one a true non-pathogenic type and the other the actual organism of Weil's disease. Rats, which have frequent opportunities of becoming infected from water, readily develop into carriers and are thus more often infected than human beings. The rats, however, play little, if any, part in the etiology of the human disease which is acquired by man, in the same way as rats but more rarely, from polluted waters. The authors believe that this view affords the best explanation of the known facts regarding the etiology of the infection of man.

In the second paper there is given a record of a series of experiments designed to test this theory. Pure cultures of a series of strains of leptospira isolated from human beings, rats and water were injected into rabbits and homologous immune sera prepared. It was found that the organisms would grow readily in a medium made by diluting inactivated serum with tap water. Using the immune sera any one organism would grow in any serum but its own homologous serum.

In this manner it was found that serologically distinct strains of human, rat and water leptospira exist. Four strains from cases of Weil's disease in Holland all agreed with one another in growing in each other's homologous serum, though they were definitely distinct from a German strain. Furthermore, it was found that of two rat strains one was closely related to one of the human strains and the other not so. It has already been shown by UHLENHUTH & ZUELZER that a water strain grown for a year in rabbit serum so changed that it had become serologically identical with a true Weil strain, while ZUELZER had demonstrated that such a water strain had become pathogenic to guineapigs. It is evident that under certain conditions changes can take place, and it is suggested that such a change might occur in the tissues of the rat. Proof of this, however, was not obtained. Assuming that rats ingest various serological types of water leptospira, as seems very probable, it would be expected that differences would occur in the organisms isolated from rats. As a matter of fact, it is known that the tissues of rats known to harbour leptospira do not always produce infection in guineapigs, and it is possible that in cases in which infection does not occur it is due to the organisms having been derived from non-pathogenic water strains. Two water strains were, however, found to grow well in the serum of rats known to be infected with leptospira.

As a result of these experiments, only a few of which have been mentioned here, it is concluded that the variability in the serological reactions of human strains, and presumably also of the rat strains, is best accounted for on the assumption of a definite correlation with the serological variability of water strains.

C. M. W.

ADAMSKI. Weilsche Krankheit. Bemerkungen zu der Arbeit von Uhlenhut in Jg. 5, Nr. 25, S.1113 u. Nr. 26, S.1163 dieser Wochenschrift. [**Weil's Disease. Remarks on Uhlenhuth's Papers** (See above).]—*Klin. Woch.* 1926. Aug. 27. Vol. 5. No. 35. p. 1615.

In the light of the remarks made by UHLENHUTH and GROSSMANN, whose paper is reviewed above, the author calls attention to the case of a human laboratory infection with leptospira isolated from rats and already described by him (this *Bulletin*, Vol. 23, p. 605).

C. M. W.

PETIT (Auguste). La sérothérapie des spirochétoses ictéro-hémorrhagiques et de la poliomyélite. [**The Serotherapy of Spirochaetosis Icterohaemorrhagica.**]—*Progrès Méd.* 1926. Feb. 20. No. 8. pp. 279–289.

This paper deals, firstly, with the serum therapy of *Leptospira icterohaemorrhagiae* infections in man. The author points out that before the organism was cultivated he prepared a serum by injecting horses with the tissues of infected animals. This procedure produced a serum specific to the spirochaetes, but though it was abandoned when it was possible to inject pure cultures of the organism in place of the infected tissues the experience gained suggested the possibility of producing specific sera in the cases of unknown organisms. By the application of this method the antipoliomyelitis serum described in the second part of the paper was made.

As regards the antispirochaetal serum, its use in France is limited, for in most of the cases the disease is of such a mild nature that serum

therapy is unnecessary. Medical men are, however, agreed that in severe cases its use is indicated, for though it does not cut short the fever or influence the jaundice, it benefits the patient in that his general condition is improved, the elimination of the spirochaetes is accelerated and convalescence, so slow in cases which have not had the treatment, is hastened. The dosage is 60 cc. daily for 3 to 5 days in the case of a man weighing 70 kilograms. In France mortality from the infection is only 5 per cent., while in Japan it is reported to be as high as 95 per cent. It is suggested by the author that this discrepancy is due to the fact that the Japanese figure refers to cases seen in the year of discovery of the organism, when it may be conjectured that only the severe typical cases were recognized.

C. M. W.

ISHIZU (Yoshitada). Ueber das Blutbild und die haematopoetischen Organe (Milz, Knochenmark) bei der experimentellen *Spirochätosis ictero-haemorrhagica* (Weilschen Krankheit). [**The Blood Picture and Haematopoietic Organs in Experimental Weil's Disease.**—*Scientific Reports Govt. Inst. Infect. Dis.* Tokyo. 1925. Vol. 4. pp. 255–258.

The blood picture of experimental Weil's disease in guineapigs is that of a leucocytosis, the number of cells being from 1·2 to 2·5 times the normal. There is an absolute and relative pseudoeosinophilia and lymphopenia, and a reduction or disappearance of eosinophile leucocytes. The pseudoeosinophile cells are actually increased to twice or three times the normal number and reach a figure of 70 to 80 per cent. compared with the normal 30 to 50 per cent.

In the spleen the follicle cells are scanty and those present are irregularly arranged and vacuolated and at times show pycnotic nuclei. A remarkable feature is the occurrence of erythrophagocytes in the sinus lumens. The bone marrow shows a marked augmentation of the megakaryocytes and a definite reduction of the pseudoeosinophile leucocytes. The bulk of the marrow parenchyma is made up of pseudoeosinophile myelocytes and normoblasts, so that pathologically, the bone marrow assumes the characters of the red myelotic-erythroblastic marrow of Naegeli.

The rest of the paper is occupied with a discussion of the relationship of these findings to one another and their bearing on the pathology of the disease and the changes which occur when a cure is brought about by the use of specific serum. As controls the blood, spleen and bone marrow of normal guineapigs injected with other sera were examined.

C. M. W.

PAGNIEZ (Ph.). Au sujet d'une réaction colorée spéciale des urines au cours de la spirochétose ictérigène. [**On a Special Colour Reaction of the Urine in Infectious Jaundice.** *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1926. June 3. Year 42. 3rd Ser. Vol. 50. No. 19. pp. 858–859. [1 ref.]

In an earlier paper the author, in collaboration with other workers, drew attention to a reaction of the urine in cases of *Leptospira icterohaemorrhagiae* infections.* During the height of the jaundice, between the first and eighth days of the disease, the urine is heavily charged with

*PAGNIEZ (Ph.), CAYREL (A.), LÉVY (P. P.) & DE LÉOBARDY (J.). Étude clinique de 45 cas de spirochétose ictérigène.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1917. p. 1181.

bile pigments. The addition of one or two drops of acetic acid to a few cubic centimeters of urine, and heating, as in the well-known albumin test, causes the acidined part of the urine to assume a green colour which may be very intense. The colouration may occur even without heating. It appears to be due to oxidation of the bile pigments which occurs readily in this particular disease, but not in other forms of jaundice. The author again draws attention to the reaction, as he has found it very marked in the case of young man who recently contracted the disease after contact with the mud of the Marne, during a bathing expedition.

C. M. W.

TAGAWA (Sentaro). [**On So-called Sakushyu-Fever. Communication 1.**] —*Okayama Igakkai Zasshi.* (*Jl. Okayama Med. Soc.*) 1925. Aug. No. 427. [Summarized in *Japan Med. World.* 1926. Apr. 15. Vol. 6. No. 4. p. 95.]

Sakushyu fever is an epidemic disease occurring in a certain district of Okayama and is clinically very similar to spirochaetosis haemorrhagiae or Weil's disease. Immunological experiments were carried out by the author. He injected mixtures of the spirochaetes of Weil's disease and those of seven-day fever with the serum of the patients into animals; the results were inconclusive, some being positive, others negative.

P. W. Bassett-Smith.

SOESILO (R.). [Vergelijkende studie van enkele pathogene leptospiren-stammen en leptospiren, afkomstig van de rattenbevolking van Amsterdam en omgeving.] [**Comparative Work on Pathogenic and Rat Strains of Leptospira at Amsterdam.**]—Thèse. Amsterdam. 1925. [Summarized in *Bull. Inst. Pasteur.* 1926. May 31. Vol. 24. No. 10. p. 448.]

Nine strains of leptospira isolated from Amsterdam rats were compared serologically with a strain isolated from a case of Weil's disease in Holland. Seven of the rat strains agreed with the human strain but two differed from it, though they agreed with BAERMANN's strain which had been isolated from febrile spirochaetosis in Sumatra. This discrepancy suggests that in Holland there may be two human diseases, one actual Weil's disease and the other a less severe type of infection like that encountered in Sumatra.

C. M. W.

SAILER (Joseph), with a Bacteriological Note by J. C. SMALL. **Leptospirosis Icterohemorrhagica (Weil's Disease).**—*Amer. Jl. Med. Sci.* 1925. Sept. Vol. 170. No. 3. pp. 332–341. With 1 fig. [21 refs.]

The paper describes two typical cases of Weil's disease in men aged 51 and 44 in Philadelphia. In the first case leptospira were seen by dark-field examination of the blood while from the urine of the second guineapigs were infected. Both cases recovered.

C. M. W.

BURTON-FANNING (F. W.) & CLEVELAND (A. J.). **Spirochaetosis icterohaemorrhagica in Norfolk.** —*Brit. Med. Jl.* 1926. July 17. p. 108. [3 refs.]

A description of four unassociated cases of infectious jaundice, three of which were fatal. The causal organism was found in the urine of one of the cases, but the symptoms of all were so similar that there is little doubt as to the correctness of the diagnosis.

C. M. W.

## YELLOW FEVER.

AITKEN (A. Blair), CONNAL (Andrew), GRAY (G. M.) & SMITH (E. C.). **Yellow Fever in Lagos during 1925. Clinical and Pathological Notes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. June 17. Vol. 20. No. 3. pp. 166–184. With 12 charts.

An outbreak of yellow fever occurred in Lagos in 1925 and afforded an opportunity of studying the disease. The cases officially reported were 12 in number and of these 7 died. In addition there were 5 cases which were regarded as suspicious. They all recovered. The first 2 cases occurred in members of the crew of a dredger in Lagos harbour. In neither was a definite diagnosis made, but it seems possible that they were the cause of the outbreak. There is no evidence that the disease was introduced; Case 5, however, occurred in a man who had been for 3 weeks in Ibadan (120 miles distant) during which a case of yellow fever was reported. On his return to Lagos he lived in the quarters from which Case 3 had been removed 2 days previously, he himself being removed to hospital 5 days after his return.

The chief features of the various cases are set out in 3 Tables. Cases seen within the first 24 hours presented little which was characteristic of the disease. Vomiting was frequent and severe from the beginning, in the fatal cases as also in those that recovered. The earliest occurrence of "coffee-ground" vomit was on the third day. Backache was a prominent feature in only one case, which recovered. The yellow tint was faint in 2 cases and in the remainder, with one exception, it deepened but little during life. Epigastric tenderness was severe in only 2 cases, which terminated fatally. It was neither severe nor an early symptom in the other cases and could be described as an hepatic tenderness associated with the progressive enlargement of the liver. The urine diminished in amount daily up to almost complete suppression. Albuminuria was a marked feature of all but 2 cases. Convalescence was in all instances relatively slow. This was in marked contrast to the rapid recovery usually seen in the malaria of Lagos.

The carefully conducted laboratory work included blood examinations, cultivation experiments, inoculation of guineapigs, pathological studies, Pfeiffer's reaction and mosquito transmission experiments with *Aëdes argenteus* and guineapigs. The results obtained did not lend support to the view that the cases were caused by malaria, and though no evidence of the presence of leptospira could be obtained, the histopathology and the clinical picture were both those of yellow fever.

C. M. Wenyon.

LAURENT (J. M.). Là fièvre jaune dans le golfe du Bénin. [**Yellow Fever in the Gulf of Benin.**—*Rev. Méd. et Hyg. Trop.* 1926. July-Aug. & Sept.-Oct. Vol. 18. Nos. 4 & 5. pp. 111–121; 129–158. [1 ref.]

A report by SPIRE (this *Bulletin*, Vol. 19, p. 568) on the history of yellow fever in Dahomey having come to the author's notice in 1923,

he instituted enquiries regarding the cases diagnosed. As the result of his investigation it is his belief that the deaths which occurred in 1905, 1907, 1913 and 1921–1922 were wrongly attributed to yellow fever. The various official records which he has obtained together with reports from the local medical officers are analysed in detail, and he is convinced that malaria affords a sufficient explanation. He points out that the ictero-haemorrhagic syndrome is not pathognomonic of yellow fever, but is found in all serious icteric conditions, whatever their cause. For instance, in the *Traité de pathologie exotique* of GRALL et CLARAC the following symptoms are attributed to malaria—simple purpura, haemorrhagic purpura, visceral haemorrhages which may end fatally (bleeding from the gums, melaena, haematemesis, haematuria), epistaxis, hepatic manifestations in the form of benign febrile icterus or more serious icterus with elevated temperature, adynamic and sub-delirious state, bilious vomiting and death from cardio-vascular collapse associated with hypothermia and weak pulse. Similarly, Noël FLESSINGER describes serious types of malaria with gastro-intestinal haemorrhage in Macedonia where yellow fever has never been considered. In many cases the diagnosis of yellow fever in Dahomey has been made without sufficient evidence, so that at present Mono is recognized as an endemic centre of the disease, and there is a tendency to ascribe every death to its agency. The author points out that in Grand-Popo, Ouidah and Abomey it is merely the black vomit and a a notion of epidemicity which result in a diagnosis of yellow fever. Thus, of 13 cases diagnosed as such in Grand-Popo in 1905, 6 did not have haemorrhage, 1 had doubtful haemorrhage from the stomach, 4 were not directly observed, while only 2 had a definite ictero-haemorrhagic syndrome. He states that he has practised in Ouidah and Grand-Popo for 10 years and has never heard of or seen cases of black vomit in children.

The chief of the Health Service of Dahomey maintains that yellow fever is admitted to be endemic, that the black races are not absolutely immune, and that during the epidemic period before Europeans are attacked there has been observed amongst the children a type of icteroid fever which can be regarded as an attenuated form of yellow fever. None of the reports, however, mentions such a disease of children, though with reference to the Abomey outbreak of 1912 the physicians do say that they had been told there had been an abnormal mortality amongst the children and young people. The only symptom noted, however, was fever. As a result of his examination of the records and information he has collected regarding the cases, the detailed symptomatology of which is set out in the paper, the author concludes that the diagnosis of yellow fever is unjustified and that in spite of hesitation on the part of the medical officers attending the cases this diagnosis has been officially forced upon them. Furthermore, the available records from Nigeria and the Gold Coast do not lend support to the view that yellow fever is endemic. Though malarial parasites may have been absent from the cases an explanation of this can be found in the quinine which is always taken in increasing doses when there is any indisposition.

The author concludes by asking two questions. If yellow fever is epidemic, whence does it come? and if it is endemic, why should useless and inconvenient quarantines be established?

C. M. W.

i. BRAU. Rapport sur l'épidémie de fièvre jaune à Toukoto (cercle de Kita, Soudan). [**The Yellow Fever Epidemic at Toukoto.**]—*Ann. de Méd. et de Pharm. Colon.* 1926. Apr.–May–June. Vol. 24. No. 2. pp. 169–181.

ii. ABBATUCCI. Y a-t-il eu des cas de fièvre jaune au Soudan pendant les mois d'octobre-novembre 1925? **Was there Yellow Fever in the Soudan, Oct.-Nov. 1925?**—*Ibid.* pp. 182–185. 2 refs.

iii. LAURENT (J. M.). La fièvre jaune dans le golfe du Bénin. [**Yellow Fever in the Gulf of Benin.**]—*Rev. Méd. et Hyg. Trop.* 1926. Nov.-Dec. Vol. 18. No. 6. pp. 175–176. [1 ref.]

i. & ii. These three papers deal with the outbreak at Toukoto. The author of the first, on the assumption that the disease was yellow fever, describes in detail the energetic prophylactic measures which were put into force and which are regarded as having been effectual in checking the spread of the epidemic, while the author of the second, without deprecating the decision of the authorities in immediately instituting these preventive measures, considers that the facts observed regarding the cases are capable of other interpretations, of which relapsing fever may be one.

iii. The author of the third paper notes that of the nine cases three only were regarded as yellow fever, the others being diagnosed as malaria in spite of the fact that two were fatal and one vomited material of a chocolate colour with black spots. In none of the three cases labelled yellow fever was the icterohaemorrhagic syndrome present, for the word jaundice is not mentioned in their reports. The first case had neither black vomit nor haemorrhage; the second had coffee-coloured vomit, but this can be attributed to swallowed blood from the severe and continued epistaxis; the third case also had epistaxis, but vomited once only, and on that occasion material of such a character and quantity that haemorrhage into the stomach can be admitted. The author enquires why under these circumstances should yellow fever be considered when malaria offered a sufficient explanation of the outbreak? The placing in quarantine of Toukoto was unjustified and led to the removal of all Europeans, at a time when malaria is particularly virulent, to a comfortless camp where two of the victims met their death.

C. M. W.

SULDEY (E. W.). La fièvre jaune au Soudan (Toukoto, 1925). **Yellow Fever in Toukoto, 1925.** *Bull. Soc. Path. Exot.* 1926. July 7. Vol. 19. No. 7. pp. 604–613. [3 refs.]

The six cases which occurred in Europeans in Toukoto during October and November, 1925, and were regarded as yellow fever, have already been commented upon by BRAU and ABBATUCCI (this *Bulletin*, Vol. 23, pp. 609, 610). Owing to certain doubts which have been expressed the author of the paper under review has thought that some further details of the outbreak may be of interest, especially as they emphasize the importance of early diagnosis, both clinical and laboratory, from the point of view of the establishment of prophylactic measures. The first case died without any laboratory examinations having been made and yellow fever was not considered. The second case occurred ten days later. The patient had taken no quinine and though the parasites of malignant tertian malaria were found in

the blood the clinical picture was sufficiently suggestive to give rise to the suspicion that it was a case of yellow fever complicated with malaria. Accordingly preparations were made for the most energetic measures of prophylaxis, including inoculation with Noguchi's vaccine. Fourteen days later the third case, in a recent arrival, occurred. This was definitely diagnosed as yellow fever from the clinical pictures and the laboratory findings. The elaborate measures which had been prepared were at once put into operation, all the Europeans, including the children, being inoculated with the vaccine. The fourth case, which was not severe and which, like the third, recovered, occurred after a fortnight's interval. The fifth and sixth cases, which terminated fatally, occurred 8 days after the fourth case. Both had received the protective inoculation, but infection evidently took place within the period necessary for the development of complete immunity. The individuals concerned had not followed the regulations which prohibited wandering about at night. These two cases gave rise to the greatest alarm amongst the population and facilitated the enforcement of the prophylactic regulations, some of which had not hitherto been followed. Soon all danger of further spread was at an end and the quarantine was removed. The great importance of early diagnosis is well illustrated by the history of the outbreak and both clinical and laboratory findings enable other conditions to be excluded. The use of Noguchi's vaccine is considered to have been efficacious in controlling the epidemic. It has to be remembered, however, that the use of the vaccine must not be an excuse for the neglect of anti-mosquito measures. [In the review of ABBATUCCI's paper (this *Bulletin*, Vol. 23, p. 610) it was erroneously stated that six deaths occurred instead of four.]

C. M. W.

BRAU. Récentes manifestations de fièvre jaune en Afrique occidentale française. [**Recent Manifestations of Yellow Fever in French West Africa.**]—*Bull. Soc. Path. Exot.* 1926. July 7. Vol. 19. No. 7. pp. 645–654. [1 ref.]

This paper is a continuation of that previously reviewed (this *Bulletin*, Vol. 23, p. 609). Attention is again called to the importance of the early diagnosis of yellow fever. The diseases which may give rise to doubt are severe jaundice or yellow fever *nostras*, relapsing fever, haemoglobinuria, malignant malaria, bilious types of typhoid fever, sun stroke and icterohaemorrhagic spirochaetosis. The differential diagnosis of these various conditions is discussed. Attention is called to the uses of Noguchi's vaccine and serum in the prevention and treatment of yellow fever.

C. M. W.

HERNANDEZ BAUTISTA (Dario). La fiebre amarilla de 1923 en Bucaramanga. [**Yellow Fever in Bucaramanga in 1923.**]—*Repert. de Med. y Cirug.* Bogota. 1926. Feb., Mar., Apr., May, June & July. Vol. 17. Nos. 5, 6, 7, 8, 9 & 10. (197, 198 199, 200, 201 & 202.) pp. 267–288; 334–349 [3 refs.]; 398–415 [3 refs.]; 463–475; 510–531; 582–602 [14 refs.].

A part only of this long paper deals directly with the epidemic of yellow fever in Bucaramanga in 1923. The whole is divided into four Parts, each of which has several sections. Part I gives

a description of Bucaramanga and its climatology. Part II, the longest, is devoted mainly to yellow fever in general, the biology and cultivation of the Leptospira, the transmission of the virus, the bionomics of the vector, general remarks on the epidemiology of yellow fever and the question of immunity. Dengue and yellow fever are compared.

The epidemic in 1923 is shown to have been due to spread from an endemic focus and not to importation from without, and the epidemic appears on the whole to have been a mild one. In this part also an account is given of the post-mortem findings, which were typical. The serum of convalescents was found to agglutinate cultures of *L. icteroides* and *L. icterohaemorrhagiae* equally, but Pfeiffer's reaction yielded positive results with the former only.

The symptoms of three cases are detailed; one, an average case, terminating in recovery, the second, a severe case, ending fatally, as did also the third which was complicated by malaria.

Various forms of treatment were adopted, including Sternberg's mixture and haemostatics as perchloride of iron, but the best results were obtained with arsenical preparations, notably neosalvarsan, which many practitioners came to regard as a specific even in severe cases. Prophylaxis was on the usual lines, with the help of a staff sent from the Rockefeller Foundation. The author states that by these means the disease was eradicated in 60 days; that Bucaramanga is now free from yellow fever and that future outbreaks can only arise from fresh importation. Dengue has also disappeared.

Part III is chiefly statistical, stating the number of houses visited and the number found infested [presumably by *Aëdes aegypti*] between June, 1923 and March, 1924. In the first three months the numbers of infested houses were 1,301, 2,270, and 1,327 respectively. After August the number diminished rapidly, and in the following March was only 27. In this part also are given the rules and regulations laid down as to the duties of those engaged in the campaign.

Part IV is occupied with a narration in detail of several cases of yellow fever and two of dengue.

H. Harold Scott.

HANSON (Henry). **Some Atypical Cases of Yellow Fever in Salvador.** —*Amer. Jl. Trop. Med.* 1926. July. Vol. 6. No. 4. pp. 261–270. With 4 charts. [1 ref.]

The paper describes four cases of what appeared to be atypical yellow fever which occurred during the recent outbreak of this disease in San Salvador. Three of the patients had been vaccinated but fell ill within 14 days after the second inoculation, i.e., before the elapse of the period required for the establishment of immunity. They presented a mild type of the disease. An unvaccinated individual had severe initial symptoms and his illness appeared like a severe first day case of yellow fever with cerebral manifestations, which usually ends fatally. The symptoms rapidly subsided after a full dose of Noguchi anti-yellow-fever serum. All the cases were from the same hotel in the most pronounced focus of infection. None had the characteristic marked albuminuria. Malaria was excluded by blood examinations and absence of enlargement and tenderness of the spleen. All four ended in recovery. Two patients gave a positive

Pfeiffer reaction and one left the country before the test was made. The patient who had received serum treatment gave a negative reaction, but it was thought that the serum given within 24 hours of the onset of the disease had neutralized the antibody-forming properties. The treatment included what the author regards as the five most important points in dealing with yellow fever patients, viz., complete rest in bed, starvation, catharsis, administration of water, seclusion of the patient.

C. M. W.

TORRES (C. Magarinos). [In Portuguese & English.] Sobre a importancia no diagnostico post-mortem da febre amarella, das lesões microscopicas descriptas por H. da Rocha Lima e por Hoffmann. **On the Importance, in Post-Mortem Diagnosis of Yellow Fever, of the Microscopic Lesions described by Rocha Lima and Hoffmann.** *Mem. Inst. Oswaldo Cruz.* 1926. Vol. 19. No. 1. In Portuguese pp. 5–11. In English pp. 13–18. With 4 figs. on 1 plate. [6 refs.]

The post-mortem appearances of a case of yellow fever described in the paper were so atypical that from these alone a diagnosis could not have been made. The liver did not show the usual enlargement and colouring while there were haemorrhagic lesions in the lungs which are rarely seen in this disease. Microscopic examination of sections of the liver and kidneys, however, produced convincing evidence that the correct diagnosis had been made. In the liver fatty degeneration unassociated with other lesions occurred round the portal spaces. In the intermediate zone of the lobule there was, in addition to fatty degeneration, cellular necrosis which affected isolated cells of the liver trabeculae. The necrotic cells were reduced in size, were highly eosinophilic and possessed karyolitic or pycnotic nuclei. The kidneys, in addition to the extensive fatty degeneration of the tubular epithelium and the presence of hyaline and haemorrhagic casts, revealed the calcified casts first described by HOFFMANN. These appear to be formed by an acute process of deposition of lime salts so that the casts stain blue with haematoxylin. The lime casts may occur accidentally in various infectious diseases, but not with any constancy or frequency. They have not been observed in Weil's disease.

C. M. W.

HOFFMANN (W. H.). Das Krankheitsbild des Gelbfiebers. [**The Disease Picture of Yellow Fever.**]—*Deut. Med. Woch.* 1926. Oct. 8. Vol. 52. No. 41. pp. 1729–1732. [1 ref.]

Yellow fever is a disease with septic haemorrhagic characters resulting from infection with *Leptospira icteroides* which, by means of its toxin, damages chiefly the parenchymatous organs, the blood vessels and the blood. The acute degeneration of the liver and kidney cells and particularly those of the heart muscle often brings about a rapidly fatal issue. The degeneration of the vessel walls causes multiple haemorrhages which find their most severe expression in the haemorrhagic vomit. The destruction of red blood corpuscles and the subsequent absorption of haemoglobin is the cause of jaundice which is of a pure haematogenous type. Fortunately, the very virulent spirochaete poison rapidly brings about the production of protective

and curative substances which often result in the disease running a mild course with rapid recovery. The severe cases which occur in endemic areas are correlated with an unusually high virulence of the causative organism. On the other hand, many mild cases occur amongst children in whom the disease may pass unrecognized and last only a few days. It is the rule for such cases to occur where the disease is sporadic and has not yet become generalized. The diagnosis may present great difficulties and be impossible unless the organism can be demonstrated.

C. M. W.

HOFFMANN (W. H.). **Yellow Fever Control in West Africa.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 29. No. 20. pp. 349–351.

The author advocates the energetic application to Africa of those methods of yellow fever control which have proved to be so effectual in checking the disease in America.

C. M. W.

## UNDULANT AND ABORTUS FEVERS.

i. ZDRODOWSKI (P.). Sur la charactéristique de la fièvre mediterranéenne en Azerbaidjan. [**Undulant Fever in Azerbaidjan and Baku.**]—*Trav. Inst. Microbiol. et Hyg. d'Azerbaidjan.* Baku. 1925–26. Nos. 2–3. pp. 101–122. [In Russian.]

ii. TER-GRIGOROFF (H.). De la diagnose de la fièvre mediterranéenne en Azerbaidjan.—*Ibid.* pp. 123–129.

iii. BRENN (H.) & AMID-ZADÉ (G.). Recherches sur la fièvre mediterranéenne dans l'abattoir de la ville de Bakou.—*Ibid.* pp. 130–138.

iv. KOLESNIKOFF (N.). Sur l'anatomie pathologique de la fièvre mediterranéenne expérimentale.—*Ibid.* pp. 139–150.

i. The author summarizes the results of three years' experience with undulant fever in the Caucasus, the first cases of which were observed in Azerbaidjan in 1922. Since that time the disease has been found to be prevalent in nearly all parts of the Caucasus, including the Black Sea Coast. Apart from goats, the source of infection was traced to sheep and their products, and to cattle (including buffaloes).

ii. During the second half of 1925, the author diagnosed eleven cases of undulant fever by serological and bacteriological methods. In the serological test Wright's agglutination reaction was employed, the dilutions varying from 1 : 100 to 1 : 5,000. The results were recorded after 3–4 hours incubation, and again after 24 hours at room temperature. The bacteriological examination was carried out as follows: 10 cc. of blood taken aseptically from the elbow vein were inoculated into two flasks, each containing 100 cc. of neutral broth. These were incubated for several days, care being taken not to shake the flasks, thus allowing the blood clot to suspend from the surface instead of falling to the bottom.

iii. Wright's agglutination test and Bordet-Gengou's reaction of fixation of alexin were used by the authors in the examination of 249 sheep and 82 cows at the Baku slaughter-house. Micrococcus infection was indicated in 5·2 per cent. of the former and in 48· per cent. of the latter. Serological investigation of 120 employees of the slaughter-house pointed to an infection in 5 per cent.

iv. The author records the results of post mortem examination of 12 guinea-pigs infected *per os* with the Azerbaidjan strain of micrococcus, and killed at periods from one to nine months after inoculation. The pathological anatomy of these cases was as follows :—

1. *Spleen.*—Hypertrophy produced by diffuse and focal proliferation of reticular cells ; productive perisplenitis.

2. *Lymphatics.*—Lymphoid tissue atrophied ; proliferation of reticular tissue ; desquamative, and sometimes haemorrhagic or purulent sinusitis.

3. *Liver.*—Productive perihepatitis ; proliferation of endothelium with formation of tubercles ; degeneration of liver cells.

4. *Lungs.*—Productive inflammation with formation of tubercles, similar to those in tuberculosis ; compensatory emphysema.

Among the minor manifestations are recorded abscesses in the epididymis, absence of spermatozoa in the seminiferous tubules, and cloudy swelling of the epithelium of the convoluted tubules of the kidneys.

C. A. Hoare.

ROZNATOVSKY (J. P.). [La fièvre ondulante dans le Caucase du Nord.] [**Undulant Fever in Northern Caucasus.**]—*Rapport Soc. Méd. Rostov. et Séance conjointe Cons. San. et Epidém. et Assoc. Inst. pour recherches scientif.* 1926. [Summarized in *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. pp. 723–724.]

The presence of undulant fever to the North of the great Caucasian chain of mountains was demonstrated for the first time in November, 1925, by isolation of the specific organism in the blood and urine of a patient giving signs of the fever in the Clinic of the University of Rostov s Don. An epidemiological investigation was made by the author in the village, in the province of Salle, from which the patient came. He examined 45 people; 8 gave a positive agglutination reaction at 1 in 50, 4 at 1 in 100, 3 at 1 in 500, and 1 at 1 in 1,000. Two active cases gave satisfactory results when treated by autohaemotherapy. Positive results were obtained in serum of 4 out of 8 goats, 2 sheep out of 3, and 2 horses out of 3.

The author thinks that the disease was imported from Trans-Caucasus (Kars) in 1922, and is spread by the manufacture of briquettes from the excreta of the horse and sheep, the only fuel.

P. W. Bassett-Smith.

ALESSANDRINI (A.). Sopra un focolaio epidemico di febbre maltese. [**A Small Epidemic of Undulant Fever.**] —*Policlinico.* Sez. Prat. 1926. Sept. 27. Vol. 33. No. 39. pp. 1345–1352. [23 refs.]

This is an account of a small focus of [what was believed to be] undulant fever, the interest of which consists largely in the working out of the origin of the outbreak. In January and February of 1926 in several flocks of goats and sheep there was a high percentage of abortion; in one flock 38 out of 40; in another 14 goats out of 20, and 15 sheep out of 60. It is important to note that no cases occurred among bovines. In the third week of March, M.G., the owner of the first flock, was attacked, and ten days later his wife. The symptoms in the former were high fever and renal complications, which brought about death in 2½ months. In the latter, there were fever, epistaxis, vomiting, metrorrhagia, diarrhoea, and complete anuria for ten consecutive days, death occurring on the 20th day of disease.

During the succeeding three months there were 40 cases, 20 men, 16 women, 4 children. The local practitioner stated that during his 3½ years' residence in the locality he had not seen a case of undulant fever. The serum of the first patient, M.G., agglutinated *M. melitensis* and *B. abortus* in equal titres. Agglutinins were totally removed by heating to 65° C. for half an hour.

Three other cases are particularly mentioned, a man, his wife and his mother-in-law. None of the three kept goats, nor did they drink goats' milk or eat any of the products made from it. All three fell victims, and on enquiry it was found that they had been employed in cleaning the stalls occupied by goats belonging to M.G.

H. Harold Scott.

FINZI (Guido). Sulla eziologia dell'aborto epizootico e sull'origine della febbre maltese nell'uomo. [**The Cause of Contagious Abortion and the Origin of Undulant Fever in Man.**]—*Moderno Zooiatro.* 1926. Sept. 11 & Oct. 9. Year 15. Ser. 5. Nos. 37 & 41. pp. 817–828; 921–932.

This paper offers a good general review of the much-debated question of the causative organisms of undulant fever and contagious abortion. The subject is discussed under the following main headings: Can contagious abortion be considered as a strictly specific disease due in every case to the *B. abortus* of Bang, or are there other organisms closely allied to this, capable of producing the same condition with corresponding pathological changes? Analogously, is undulant fever in man always due to the *M. melitensis*? These are discussed on general lines and no definite conclusion is reached. Next, can *M. melitensis* produce abortion in animals, and why is this organism, the cause of undulant fever in man, pathogenic for some animals, while the *B. abortus* is not pathogenic for man? [To put the matter in so definite a form seems rather to beg the question, for certain authors have recorded human infection by the latter organism.] The author's reply, however, is that it is owing to the frequent cross-transference of the *M. melitensis* from goat to man and man to goat.

The use of abortin, amblosin, and abortoform for the diagnosis of the one, and of melitin for the other, on lines analogous to the tuberculin reaction by intradermal inoculation is mentioned.

The paper ends with a statement of the recommendations for prophylactic treatmnet by biological means: For healthy cows not exposed to immediate risk of contagion 15 cc. of vaccine should be given, followed 8 10 days later by 20 cc., and no access allowed to the bull for another 20 days.

For healthy cows which are exposed to infection 20 cc. of antiserum is injected at the base of the neck on one side and 10 cc. of vaccine on the other. 30–40 days later 10 cc. of vaccine alone is given, and repeated after a like interval. If the cows have already aborted, vaccine in doses of 10, 15, and 20 cc. at 30–40 days' interval is injected in the early months of the next pregnancy. The same procedure may be carried out later, but not in the final month; if any treatment is given then the serum, in a dose of 20 cc., is better.

H. Harold Scott.

CARPENTER (C. M.) & MERRIAM (H. E.). **Undulant Fever from** *Brucella abortus*. **Report of Two Cases.**—*Jl. Amer. Med. Assoc.* 1926. Oct. 16. Vol. 87. No. 16. pp. 1269–1271. With 1 chart in text. [3 refs.]

The authors bring forward again the cases of two students who, while working in the laboratory, contracted an undulant type of fever apparently through infected cows' milk. From the blood of each case an organism was isolated responding to the tests for *Br. abortus*; injected subcutaneously it produced abortion in heifers in their first pregnancies, causing atypical infection of the placenta, and was recovered from that organ and the foetus. The cultures were virulent for guineapigs producing lesions similar to those produced by *Br. abortus*.

These cases appear to show that the bovine form of the organism can give rise to a prolonged infective disease in man and that the specific organism can be recovered from the patient, causing again, when injected into animals, the typical symptoms and lesions of *Br. abortus*. There is, however, a slight doubt whether the milk was the origin of the infection, and therefore the deductions cannot be definitely accepted.

P. W. B–S.

MOORE (V. A.) & CARPENTER (C. M.). **Undulant Fever in Man associated with Bacteria Indistinguishable from** *Brucella abortus*. [Abstract.]—*Amer. Jl. Path.* 1926. Sept. Vol. 2. No. 5 (11). p. 455.

The work of Carpenter and others is reported, and it is stated that so far no case of human abortion has been traced to *Br. abortus*. In the discussion Dr. EWING asked if the glands were infected in these so-called cases of abortus fever and how they could be diagnosed from glandular fever. OLSON pointed out how easily true undulant fever might be disseminated from known foci ; 50 cases were known to have occurred in Utah with 6 deaths in the last 16 years. Goat's milk and its products were the infective agents.

P. W. B–S.

GAGE (E. E.) & GREGORY (D. A.). **Human Infection with** *Brucella melitensis* **Variety** *abortus* **treated with Mercurochrome.**—*Jl. Amer. Med. Assoc.* 1926. Sept. 11. Vol. 87. No. 11. pp. 348–349. [4 refs.]

The case reported was that of a white man, aged 33, who in March 1924 complained of chills, pains, fever and sweats. He was treated in hospital during April, but the disease was not diagnosed, though a gram-negative coccus was isolated from the blood, to which later his serum reacted positively. He was readmitted in May when the organism was recognized as *B. abortus*, and the case was diagnosed as abortus fever. He was treated with 0·2 gm. of acroflavin without improvement ; but 0·22 gm. of mercurochrome (220), though causing at first a severe reaction with chill, vomiting and bloody diarrhoea, stopped the fever. The patient had been employed in hog killing for six years and this was thought to be the source of the infection, and it is stated that the infectivity of the organism for man must be low.

P. W. B–S.

COURTOIS-SUFFIT, GARNIER & LIÈGE. Un cas de fièvre de Malte guéri à la suite de l'injection unique d'une endoprotéine préparée avec le " *Bacillus abortus* " de Bang. [**Case of Undulant Fever cured by a Single Injection of Endoprotein of** *B. abortus.*]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1926. July 29. Year 42. 3rd Ser. Vol. 50. No. 27. pp. 1329–1334. With 2 charts in text.

The interest of the case described lies in the apparent local origin of the disease (near Paris), the probable infection from close association

with animals (cattle, sheep and goats), rather than infection through food, the clinical course of the fever, the diagnosis not by blood culture, but by a low agglutination titre, and lastly, the rapid improvement after an injection of a large dose of "endoprotein" prepared from culture of *B. abortus*. The cure appeared to be due to "shock" of a non-specific character, but it might have been a specific reaction; if so, it would point to *B. abortus* being the cause of the fever.

In the debate NEITER did not consider that the cure was due to any specific action, but was a simple protein shock.

P. W. B–S.

ROGER (Henri). La spondylite mélitococcique. [**Spondylitis in Undulant Fever.** —*Presse Méd.* 1926. July 24. Vol. 34. No. 59. pp. 929–930. [4 refs.]

The author gives a description of the various forms of arthritic pains which have been noted in undulant fever. He divides them into: (1) Acute, rarely causing ankylosis or going on to suppuration. (2) Sub-acute, more common, often put down to rheumatism; these may cause organic changes and affect many joints.

When the disease is localized in the vertebral region it gives rise to special forms of spondylitis, slowly evolved and chronic in character, chiefly affecting the lumbar region, then the dorsal, more rarely the cervical. The lumbar pains are most frequent, and may be so severe as to prevent movement, but in almost all cases radiography shows nothing definitely abnormal, thus differentiating the condition from tuberculous or rheumatic arthritis. The cord is not affected, though there may be some meningeal irritation with plus reflexes; there are no secondary muscular changes. The cerebrospinal fluid may show an increase in albumen and a lymphocytosis, but it rarely contains agglutinins. The diagnosis of this melitococcic spondylitis has to be made from those of tuberculous, typhoid and rheumatic origin; this is generally effected by serum tests and radiography, but tuberculous disease may follow on a melitensis infection. The author states that after vaccines have been tried subdural injection of lipiodol should be used.

P. W. B–S.

ZANZUCCHI (A.) & VERCELLANA (G.). Ancora sulla differenziazione del *M. melitense* dal B. di Bang mediante un saggio di agglutinazione aspecifica. Nota IIa. [**Differentiation of** *M. melitensis* **and** *B. abortus* **by Non-Specific Agglutination.**]—*Pathologica.* 1926. Aug. 15. Vol. 18. No. 418. pp. 395–397.

Following up their former paper (see this *Bulletin*, Vol. 23, p. 729), the authors have tested ten more cultures of *B. abortus* from different sources for agglutination with lactic acid. Nine of them were totally negative, the other gave a strong agglutination with 1 : 20 lactic acid, diminishing till 1 : 300 was reached, after which the reaction was negative. He sums up his conclusions as follows: A strain which is agglutinated by lactic acid in dilutions above 1 : 300 is

certainly *M. melitensis*; one which is not agglutinated at all, or in low dilutions only, is certainly *B. abortus*.

[These sweeping deductions cannot be accepted until confirmed in other laboratories.—P.W.B–S.]

H. Harold Scott.

FAVILLI (Giovanni). Di alcune agglutinazioni aspecifiche nei batteri del gruppo abortus-melitensis-paramelitensis. Effetti prodotti sugli stessi batteri dal ripetuto trattamento con sieri immuni. [**Non-Specific Agglutination of the *Brucella* Group of Bacteria. The Effects on these Bacteria of Repeated Action of Immune Sera.**] —*Sperimentale.*. 1926. Oct. 25. Vol. 80. No. 4. pp. 395–415. [12 refs.]

The author has repeated the tests of thermo-agglutination of BURNET and the non-specific agglutination of VERCELLANA and ZANZUCCHI with peptone, and finds a strict parallelism between them as regards *M. melitensis*, *M. paramelitensis* and *B. abortus*. With lactic acid the results were considerably more variable. *Paramelitensis*, it is true, was agglutinated in each instance, but with the other two organisms the results were divergent. With some strains there was a strong agglutination, with others none at all.

The second part of the paper presents some interesting facts: To 10 cc. of a broth culture of *M. melitensis* the author added three drops of a high titre immune serum. Twelve hours later the supernatant fluid was pipetted off and the sediment of agglutinated bacteria placed in fresh broth. After about a dozen such passages the organism no longer was agglutinable, but at the end of the third transference, though previously non-agglutinable with heat, peptone or lactic acid, it became agglutinable. These acquired properties of serum-resistance, but non-specific agglutinability, seemed to be stable; at all events, they were still retained after 36 subcultivations.

By similar treatment the *B. abortus* also took on the characters of *M. paramelitensis*, and in this case, too, they seemed to be stable.

The natural, though hypothetical, inference from the above is that the organism of undulant fever after long stay in the body, a process comparable to repeated subjection to the action of the immune serum, acquires the characters of the *M. paramelitensis*. On these lines also the existence of strains occupying a position intermediate between *melitensis* and *paramelitensis* might be accounted for.

H. Harold Scott.

TAPIA (M.) & DE NICOLAS (Martin). Sur la différenciation du *Micrococcus melitensis* et du *Bacillus abortus* par l'agglutination. [**Separation of *M. melitensis* and *B. abortus* by Agglutination.**]—*C.R. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 563–565.

Employing the technique of FICAI and ALESSANDRINI and CASTELLANI, with human, horse, goat, guineapig and rabbit serums, the authors state that they have not been able by agglutination methods to find differences between the anti-sera of the two organisms sufficiently clear to admit of their separation; thus they disagree with the findings of EVANS, KHALED & PALETTINI. With heated sera the

results were no better ; they state that the differences in the resistance to heat are more dependent on the species of the animal than upon the species of the microbe. These results support the findings of BURNET, that the differences noted are no greater than are often seen in various strains of the same organism.

P. W. B–S.

BÉGUET. Sur le mécanisme de l'agglutination (à propos du *Br. melitensis*). **The Mechanism of Agglutination** (*Br. melitensis*).]—*C.R. Acad. Sci.* 1926. July 26. Vol. 183. No. 4. pp. 323–325.

The author carried out an investigation on 52 strains of *Br. melitensis* and *Br. abortus* to determine the characters which influenced their agglutinability and came to the following conclusions :—

1. The non-specific agglutination of *Br. melitensis* and *Br. abortus* is due to a flocculation of peri- and inter-bacterial substances which has a mechanical action upon the bacteria themselves. These substances are filterable and can be separated. The substances which give the *non-specific agglutinability* are normally absorbed by the bacterial bodies, a slight amount only being found in the centrifuged liquid.

2. The specific agglutination appears to be the result of the flocculation of a substance special to the genus and purely bacterial in origin ; every time that the bacteria are placed in a condition of suspension a certain part passes into the liquid. Animal black (*noir animal*) is able to separate the non-agglutinable substances without affecting the specific. The laws of stability of colloidal solutions are applicable to both specific and non-specific substances. These results support to a great extent the views of CH. NICOLLE and those of BORDET. The phenomenon is complicated by the presence of at least two different flocculable substances.

P. W. B–S.

CARPENTER (C. M.). **Agglutinins for** *Brucella abortus* **in the Blood of Man.**—*Jl. Infect. Dis.* 1926. Sept. Vol. 39. No. 3. pp. 220–223. [18 refs.]

The evidence that *Br. abortus* is able to produce disease in man has been obtained by isolating the organism from the blood and the specific agglutinins from the serum (GRINSTED & HOLTH). Drinking raw infected milk was believed by NICHOL, PRATT & COOLEDGE to give rise to these agglutinins. EVANS states that she has found evidence of specific immune body in 59 out of 500 patients suffering from other diseases. [In England the reviewer found only 2 out of 100.] The author has studied 20 cases of undiagnosed fevers in New York and was able to cultivate the organism from 5, though in only 3 of these could positive serum agglutinations be obtained. It was found that these agglutinins did not appear in the serum until near the end of the disease, approximately after 2 months. He used Strain 80, a heat-killed antigen, a dilution of 1 in 10 or over after 12 hours incubation. (1 in 10 being positive.)

RESULTS OF AGGLUTINATION TEST OF BLOOD SERUM OF 20 PATIENTS SHOWING SYMPTOMS RESEMBLING THOSE OF UNDULANT FEVER.

| No. of Case. | Diagnosis. | Bacteriological Results. | Agglutination Test with Brucella Abortus.* |
|---|---|---|---|
| 1 | Undulant fever ... ... | Br. abortus ... ... | 480 |
| 2 | Not made ... ... | Staphylococcus albus ... | 0 |
| 3 | Not made ... ... | Negative ... ... ... | 0 |
| 4 | Subacute bacterial endocarditis. | Br. abortus ... ... | 120 |
| 5 | Not made ... ... | Negative ... ... ... | 0 |
| 6 | Not made ... ... | Negative ... ... ... | 0 |
| 7 | Undulant fever ... ... | Br. abortus ... ... | 30 |
| 8 | Typhoid fever ... ... | Br. abortus ; Bact. typhosum. | 0 |
| 9 | Typhoid fever ... ... | Bact. typhosum ... ... | 0 |
| 10 | Typhoid fever ... ... | Negative ... ... ... | 0 |
| 11 | Not made ... ... | Negative ... ... ... | 0 |
| 12 | Subacute bacterial endocarditis. | Streptococcus ... ... | 0 |
| 13 | Not made ... ... | Negative ... ... | 30 |
| 14 | Not made ... ... | Negative ... ... ... | 0 |
| 15 | Undulant fever ... ... | Unidentified Gram-negative rod. | 240 |
| 16 | Syphilis of lymph nodes... | Br. abortus ... ... | 0 |
| 17 | Influenza ... ... | Negative ... ... | 0 |
| 18 | Not made ... ... | Negative ... ... ... | 0 |
| 19 | Acute articular rheumatism. | Negative ... ... ... | 0 |
| 20 | Lagrippe ... ... | Negative ... ... | 0 |

* The figures indicate the highest dilutions of serum producing agglutination ; 0 indicates no agglutination with 1 : 5 dilution.

It is an interesting and important fact that the 5 positive cases were 2 undulant fever, 1 sub-acute endocarditis, 1 typhoid mixed infection and 1 syphilis, the typhoid and syphilis cases having no agglutinins. The author deduces from his observations that the agglutination test cannot be relied upon to detect the presence of *Br. abortus* in man.

[The variability of the antigenic properties of certain strains is rightly emphasized by the author, but the differentiation of the organism from melitensis in these undulant fever cases cannot yet be considered satisfactory.]

P. W. B–S.

DE MARE (N.). Attivazione del potere di agglutinabilita dei batteri del gruppo Tifo, Paratifo, Coli e del Melitense mediante l'influenza della bile. [**Restoration of Agglutinability of Organisms of the Coli-Typhoid Group and of *M. melitensis* by the Action of Bile.** — *Riv. di Patologia Sperim.* 1926. July–Aug. Vol. 1. No. 4. pp. 266–275. [11 refs.]

The author repeated DOMINGO's experiments showing that hypo- or non-agglutinable strains of *M. melitensis* became highly agglutinable after contact for 24 hours with ox-bile, 9 parts of the latter to 1 part of culture of the former emulsed in saline. Having confirmed these results, he found that the same held good for other organisms, such as those of the typhoid-paratyphoid-coli group. He then undertook

experiments to test what constituent of the bile was responsible for these effects, by employing solutions of the bile-salts, and found that the action was due mostly to the taurocholate and slightly to the glycocholate of sodium, a mixture of the two not summating the effects; the optimum mixture is one with 4 per cent. taurocholate and 3 per cent. of the glycocholate.

DOMINGO suggested that the result was due to washing of the bacilli free of metabolic products which interfere with the action of the agglutinins, but the author concludes that it arises from "increase of the fixation of agglutinins by the bacterial receptors from change in the colloidal state of the organisms, aided by enhanced precipitation of a new bactero-agglutinin complex." Examples are given of this increased agglutinability: thus, an inagglutinable *B. coli*, after treatment with the bile, was agglutinated with 1 : 400, the titre of the immune serum being 1 : 500; a *B. typhosus*, previously agglutinating only at 1 : 50, was raised to 1 : 1200 with a serum of titre 1 : 2,000. He also found that after such subjection to the action of bile or bile-salts the increased agglutinability was retained on subculture for several passages at least.

H. Harold Scott.

FRANCIS (Edward) & EVANS (Alice C.). **Agglutination, Cross-Agglutination, and Agglutinin Absorption in Tularaemia.**—*Public Health Rep.* 1926. June 25. Vol. 41. No. 26. pp. 1273–1295. With 3 charts in text. [1 ref.]

In an elaborate investigation of the serological methods of diagnosis of tularaemia it is stated that "agglutination of a stock culture by the patient's blood serum" is reliable. In 120 cases the titre rose very high after the first week, gradually fell after the eighth, and was not entirely lost even after 18 years. Tularaemic serum of men or

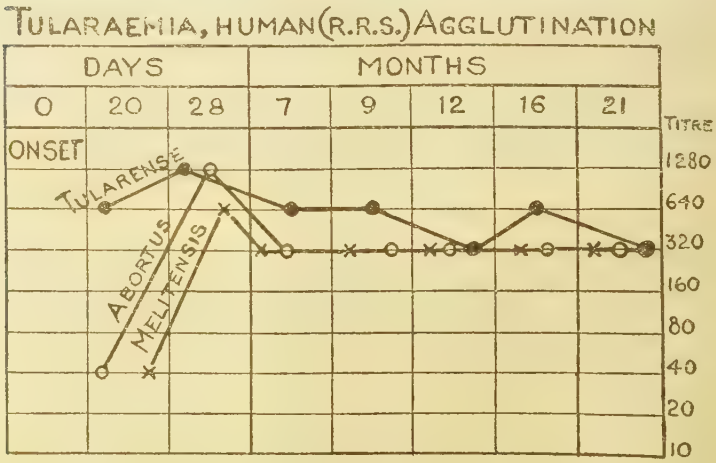


Chart.—Showing agglutination of *tularense, abortus,* and *melitensis* to the same, or nearly the same, degree by a human tularaemic serum.

[Reproduced from *Public Health Reports,* Washington.]

animals had no action on the organisms of the enterica group, dysentery, pestis, cocci, or proteus $X_{19}$; and vice-versa, the *B. tularense* is not agglutinated by these different specific sera. It was, however, found that both *B. melitensis* and *abortus* at times gave high titre reactions, rendering the elimination of this group most important in differential diagnosis of all but the most definite clinical and endemic cases of tularaemia. The parallelism of the reaction as shown in the charts is very evident. From 100 human specific sera cross agglutination with *melitensis* and *abortus* sera was seen in 37, 3 of which showed the same titre for all three organisms. The absorption experiments gave very interesting results :—

(1) *B. tularense* was readily differentiated from *B. abortus* and *melitensis.*

(2) *B. abortus* was (generally) readily differentiated from *B. melitensis.*

(3) Tularense serum differentiated *abortus* from *melitensis*, reacting as an abortus serum.

With ordinary agglutination tests a serum giving very marked differences of titre between tularense or *abortus* and *melitensis* can usually be classed as due to the organism with the highest titre, but in all cases where there is a very similar degree of agglutination the organism should be subjected to absorption tests.

The paper is very full of detail, with accurate descriptions of the technique used, and contains many tables and charts. It should be read in the original by those interested in the subject.

P. W. B–S.

CARPENTER (C. M.). **A Comparison of Strains of** *Brucella abortus* **isolated from Man with those from Cattle.**—*Jl. Infect. Dis.* 1926. Sept. Vol. 39. No. 3. pp. 215–219. [10 refs.]

The author compares the characters of 5 strains of *Br. abortus* isolated by him from the blood and urine of men, with strains recovered from bovine sources. The chief points studied were the atmospheric requirements on isolation, serological relationship, pathogenicity to guineapigs, effects on pregnant cattle and ability to grow in the udders of the cattle. The identity of the organisms isolated was established by agglutinin absorption tests, checked by comparison with known strains and serums. The cultures isolated from men could not be differentiated serologically from those of cattle, but growth was more difficult to initiate. These human strains also were highly virulent to guineapigs, but not more so than some bovine strains. The 5 human strains injected intravenously into heifers induced abortion in these animals, the organism was recovered from the milk and foetus, and it was present in the udder of one of the affected animals for 6½ months. The human strains induced abortion in the animals earlier than is usual with bovine ones.

[From this we might infer that passage through man of the *Br. abortus* increases the pathogenicity of the organism for bovines, but independant confirmation of these findings is required before accepting this deduction.]

P. W. B–S.

CERRUTTI (C.). [A proposito di un saggio di agglutinazione aspecifica per la differenziazione del *M. melitensis* dal b. di Bang.] [**An Aspecific Agglutination Test for the Differentiation of** *M. melitensis* **from** *B. abortus.* —*Giorn. d. Batter. e Immunol.* 1926. Aug. Vol. 1. No. 8. [Summarized in *Bull. Inst. Pasteur.* 1926. Oct. 15. Vol. 24. No. 19. p. 833.]

The author investigated the reliability of the lactic acid flocculation method of VERCELLANA & ZANZUCCHI for the differentiation of *Br. melitensis* from *abortus.* He was unable to accept their deduction since the strains used by them were not sufficiently defined. Testing a large number of strains of both organisms he found such variation in the results that the test was of no diagnostic value.

P. W. B–S.

## DENGUE AND PAPPATACI FEVERS.

LEGENDRE (Jean). La dengue Ouest-Africaine. [**West African Dengue.**]—*Presse Méd.* 1926. Aug. 11. Vol. 34. No. 64. pp. 1012–1014.

The author reports an epidemic of dengue in June, 1925, among the Europeans of Ouagadougou in the district of Haute-Volta, which coincided with a great increase in the number of *Stegomyia fasciata*. It affected half the white population (30 out of 60). He remarks that clinically the type in Central and West Africa is more severe and of longer duration than that in Indo-China. The onset is less sudden, the fever is remittent, lasting 4 to 5 days or even 6 to 8, but is not of the saddle-back type. The eruption is urticarial or measly in character, lasting 24–48 hours; relapses and reinfections are common. The dengue of the far East gives no immunity for the African type, but this does not prove that the diseases are etiologically different. The natives also are affected and they probably keep the infection going. No specific treatment was found. The author points out that it is not correct to describe the disease seen in Central Africa as a benign infection, for it may have meningeal symptoms with high temperature and may sometimes be fatal. It is probably endemic.

P. W. Bassett–Smith.

STOTT (H.) & MANGALIK (V.). **Seven-Day Dengue in Lucknow.**—*Indian Med. Gaz.* 1926. July. Vol. 61. No. 7. pp. 329–332. With 18 charts.

The author describes an epidemic of a short dengue-like fever which occurred at Lucknow from Sept.-Nov. 1925. The notes particularly refer to the nurses of the hospitals, who were heavily affected. The characters are of the usual type with saddle-back temperature curve and rash, but the term "seven day fever" is to be deprecated, as it is neither accurate nor useful. With regard to the insect carriers, it is stated that all kinds of mosquitoes were present, but that sand flies were very few in number.

P. W. B–S.

CHURCHILL (Frank S.), LANDIS (Eugene M.) & GLUSKER (S. David). **An Epidemic of Undetermined Nature: Dengue?**—*Jl. Amer. Med. Assoc.* 1926. Sept. 11. Vol 87. No. 11. pp. 821–824. With 3 charts. [14 refs.]

The authors describe a small epidemic of a short fever which occurred at Cape Cod during the summer of 1925, affecting 50 persons, 20 girls, 19 boys, 7 women and 4 men. The onset was sudden, fever short, pains often severe and mortality nil. The diagnosis rested between influenza, pleurodynia and dengue. The authors favour the last —the absence of respiratory symptoms with inability to isolate the bacillus of influenza [not of much value] negatived the first. Epidemic pleurodynia has recently been described from Philadelphia, New York City and New Jersey. The Cape Cod epidemic is the third

successive summer epidemic. From true dengue it is distinguished by the absence of rash, leucopenia, and *Stegomyia fasciata*, but it is stated that more research work is required to determine the etiology of the disease.

P. W. B–S.

GAGLAZOW (B. G.). **The Blood Picture in "Mosquito-Fever" in Crimea.**]—*Russian Jl. Trop. Med.* 1926. No. 3. pp. 47–51. [In Russian.]

The author notes that the so-called "Mosquito-Fever" of Crimea was identified by some Russian observers with "Sandfly-Fever," though its association with Phlebotomus has not been established. In investigating the blood picture in this disease, the author had in view mainly its differential diagnosis. The examination was conducted throughout the entire course of the disease on 127 soldiers of the Sebastopol garrison in accordance with Schilling's method. The results are summarized as follows: The blood in "Mosquito-Fever" is characterized by leucopenia, aneosinophilia, a rod-shaped nuclear degeneration of neutrophils with an apparent increase in the percentage of immature cells, neutropenia, lymphocytosis and monocytosis, and a complete absence of changes in the red cells. The changes in the blood picture appear in the order described and the return to the normal state is very slow, lymphocytosis being especially persistent. The results obtained serve to support the identity of this disease and "Sandfly-Fever," according to the author, and he believes that the absence of any alterations in the red cells shows that they are not attacked by the causative organism.

C. A. Hoare.

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## OROYA FEVER.

NOGUCHI (Hideyo). **Etiology of Oroya Fever. II. Viability of *Bartonella bacilliformis* in Cultures and in the Preserved Blood and an Excised Nodule of *Macacus rhesus*.**—*Jl. Experim. Med.* 1926. Oct. 1. Vol. 44. No. 4. pp. 533–538. [3 refs.]

The author refers to his paper recording the cultivation of *Bartonella bacilliformis* from blood which had been brought from Lima [this *Bulletin*, Vol. 23, p. 738]. He now describes further tests of the viability in infected blood, in a nodule from an experimentally infected animal, and also in culture medium. He found that 15 specimens of blood from 7 infected monkeys (*M. rhesus*) after being refrigerated for 24 to 152 days, all gave cultures of the organism, though there was apparently no multiplication during this time. The blood kept at room temperature gave growth after 45 days; the organism not only remained alive but multiplied; 0·1 cc. of a 1 in 10 mil. dilution gave growth. In an excised nodule the organism lived for 56 days at 4° C., and 28 days at room temperature; death in the latter case was probably due to autolysis of the tissue cells. For growth from tissue it is necessary to add to the saline suspension a trace of haemoglobin

and 10 per cent. of fresh horse or rabbit serum. In cultures with leptospira media at 25° C. the organism could be subcultured for 120 days, at 37° C. it dies out after 50 days, and at 4° C. it lives for months (4). The author suggests that it may be profitable to make cultures from pathological material brought from distant parts even after weeks of delay.

No photographs or drawings are given and what is meant by room temperature is not stated.

P. W. Bassett-Smith.

NOGUCHI (Hideyo). **Etiology of Oroya Fever. III. The Behavior of** *Bartonella bacilliformis* **in** *Macacus rhesus.* **IV. The Effect of Inoculation of Anthropoid Apes with** *Bartonella bacilliformis.* **V. The Experimental Transmission of** *Bartonella bacilliformis* **by Ticks** (*Dermacentor andersoni*).—*Jl. Experim. Med.* 1926. Nov. 1. Vol. 44. No. 5. pp. 697–713. With 6 text figs. & 14 figs. on 3 plates (1 coloured). [5 refs.]; 715–728. With 5 text figs. & 26 figs. on 4 plates (1 coloured). [5 refs.]; 729–734. With 3 text figs. [8 refs.]

III. Further research work on the changes noted in the *Bartonella bacilliformis* in the inoculated Rhesus monkeys showed that the virulence of the organism was increased by passage; more marked secondary anaemia was produced, in one case more like that seen in the human course of Oroya fever. The infected red cells were so few as to be rarely found in a film, but their presence was demonstrated by culture methods. The organism was constantly demonstrated microscopically and by culture test in the lymph glands, less often in spleen, bone marrow and heart blood; it was always present in the skin lesions. A striking feature of the investigation was that inoculation of the Rhesus might produce a typical verruga lesion or condition typical of Oroya fever, or both might be present at the same time. This variation of result depended upon the susceptibility of the animal as well as the virulence of the organism; moreover, different tissues of the animals were found to vary in susceptibility. Three excellent plates (one coloured) show verruga-like lesions in the monkeys and some micro-photographs.

IV. Since in the previous experiment the blood picture in Rhesus monkeys was not quite similar to that of Oroya fever in man (lacking the infected red cells and nucleated forms with pernicious character), inoculations were made into young chimpanzees, since these are closely related to man, in the hope of reaching more definite results. These animals showed only slight constitutional reactions, fewer parasites in red blood corpuscles, and little anaemia, and the verruga dermal lesions were more localized near site of inoculation. Next an orang-outang was inoculated, in which there was a moderate febrile reaction. Bartonella were found in the blood, but were few in number, and the dermal lesions remained localized, so that the results were very little more definite than in the Rhesus and less generalized. It appears, therefore, that the susceptibility of both the anthropoids to the serum was less than that found in Rhesus monkeys. Again, excellent plates (one coloured) are given of the blood and tissues.

V. Finally, experiments are detailed in which the *Bartonella bacilliformis* was transmitted from infected to normal Rhesus monkeys by bites of ticks (*Dermacentor andersoni*). The time of feeding on the

infected and normal animal had to be protracted to secure positive results (5 days and 6 days). The infection transmitted was mild but definite, as shown by recovery of *Bartonella bacilliformis* from lymph nodes and blood. Thus it is shown that the *Bartonella bacilliformis* recovered from human cases can be cultivated; cultures inoculated into monkeys and apes give rise to constitutional and local conditions like those of Oroya fever and verruga; and the infection can be transmitted through ticks.

P. W. B–S.

GUZMÁN BARRÓN (Alberto). La reacción de Van den Bergh, hemoaglutininas y hemolisinas en la enfermedad de Carrión. [**Van den Bergh's Reaction, Haemagglutinins and Haemolysins in Carrion's Disease.**]—*Crónica Méd.* Lima. 1926. Mar. Vol. 43. No. 753. pp. 79–89.

By the Van den Bergh reaction the author shows that in the severe anaemia of Carrion's disease the serum contains an increase of bilirubin and that there is jaundice of haemolytic origin. This does not occur in the eruptive stage of verruga.

Auto-agglutinins are present to a slight degree only in those cases in which the eruptive period follows severe anaemia; when there is no preceding severe anaemia they are absent, as are also auto-haemolysins in all stages of the disease.

Appended to the paper itself are details in tabular form of the tests on which the statements in the text are based. The paper is interesting, and should lead to further investigations along similar lines in other diseases.

H. Harold Scott.

## TROPICAL TYPHUS.

FLETCHER (William) & LESSLAR (J. E.). **Tropical Typhus in the Federated Malay States with a Compilation on Epidemic Typhus.**—*Bull. Inst. Med. Res. F.M.S.* 1925. No. 2. 88 pp. With 8 charts in text. [70 refs.]; *Malayan Med. Jl.* Singapore. 1926. May. Vol. 1. No. 2. pp. 17–22.

A very complete account of the disease in all its phases is given, much of which has already been recorded, and a full account of the clinical and laboratory records of the 18 cases.

It seems definitely proved that the authors were dealing with a specific non-contagious fever, probably contracted in dry grazing areas, spread by some form of tick or mite, running a course of about 14 days, with a very low mortality and definitely diagnosable if with the clinical signs there is a positive Weil-Felix reaction of titre 200 or over. MEGAW's admirable table differentiating the various forms of Typhus-like fevers is referred to (see this *Bulletin*, Vol. 19, p. 68).

The name "Tropical Typhus" is rather unfortunate, as the authors say "the term typhus is liable to mislead and alarm the public."]

P. W. Bassett-Smith.

FLETCHER (William) & LESSLAR (J. E.). **The Weil-Felix Reaction in Sporadic Tropical Typhus.**—*Bull. Inst. Med. Res. F.M.S.* 1926. No. 1. 28 pp. With 4 charts in text. [19 refs.]

The value of the Weil-Felix reaction in the diagnosis of this fever is emphasized, but a word of warning is given to ensure that the strain of Proteus X 19 used is an active one ; mistakes are made when this has not been determined. The authors examined 9 strains from various laboratories in an attempt to elucidate the divergent results of the reaction as applied to the Malayan cases and those described by MEGAW in India, and others elsewhere.

The Bland Sutton strain obtained from the Lister Institute, called here " Kingsbury," was employed alone in the earlier cases. It gave positive results in 54 cases and in 1,000 controls it was always negative, taking 1 in 200 as the minimum titre. All the strains but K produced indol in peptone water. The agglutination reactions showed that all the 9 strains were related to one another, but they separated the anindologenic strain, K, from the rest. The K strain was specific for these typhus cases, but no other anindologenic strain could be employed in its place. There are evidently two groups of cases, one giving a positive reaction with the anindologenic K strain, the second giving positive reactions with indologenic strains W type (Warsaw) and not with K. The cases themselves differed little clinically, but probably differed etiologically. In six months there were 13 of the K group and 11 of the W group. Of the 54 patients positive with K 4 died, and one of the 11 of the W group. The race incidence is interesting—32 Tamils, 20 Punjabis, 10 Europeans, 2 Malays, and 1 Chinese.

Summary.—Tropical typhus of the Malay States bears a close relationship to the typhus-like disease of MEGAW in India and similar diseases in Asia, Africa, and America.

The various strains of Proteus X 19 of different authors are not identical and are divided into two groups, indologenic and anindologenic ; the K strain differs from the other members of the latter group, but was the only one which was agglutinated by the blood of patients suffering from the tropical typhus of Malaya.

P. W. B–S.

i. FLETCHER (William) & LESSLAR (J. E.). **Tropical Typhus.**—*Indian Med. Gaz.* 1926. Nov. Vol. 61. No. 11. pp. 529–531. [13 refs.]

ii. —— & ——. **Tropical Typhus and Brill's Disease.**—*Jl. Trop. Med. & Hyg.* 1926. Nov. 15. Vol. 29. No. 22. pp. 374–378. [21 refs.]

i. This is mostly a résumé of previous papers. The probable intermediary action of mice and their ectoparasites, as shown in the Adelaide epidemics, is considered of particular value. The statement is made that in the Malay States tropical typhus is as common as typhoid, hardly a week passing without one case coming under notice in the laboratory in Kuala Lumpur. In the Malay States it has a special tendency to attack cattle-keepers, etc. ; people living in towns and working in mines almost entirely escape infection. The virus, whatever it is, will not affect guineapigs and no other animal has so far been found to be susceptible.

ii. The authors recapitulate much that has already been reviewed and appear to consider tropical typhus to be a mild form of epidemic typhus altered by climate and environment. Epidemic typhus is a disease of cool climates and in hot countries flares up in the winter months and dies down in the spring; tropical typhus behaves in an opposite manner. The symptoms are the same and serum reactions similar, but as the mortality differs they are totally separated from a practical point of view. Brill's disease with similar characters is, and has been, looked upon as a distinct disease from epidemic typhus by many. The etiology is as yet uncertain, and it is therefore impossible definitely to classify them.

P. W. B–S.

SPENCER (R. R.). **A Case of Typhus-like Fever following Tick Bite.**—*Public Health Rep.* 1926. Nov. 5. Vol. 41. No. 45. pp. 2523–2524.

A woman aged 35, wife of a butcher in Norfolk, Va., was bitten in three places by a tick which came from a calf hide shipped from Virginia. At each site redness, swelling and a small ulcer followed. Ten days later fever set in with muscular pains, followed by prostration, typhus-like rash and general symptoms of that disease.

The serum did not agglutinate *Proteus* X 19 and the results of inoculation of guineapigs were negative. Clinically, the case was typhus, but laboratory confirmation was not obtained. These ticks (*Amblyomma americanum*) have not previously been implicated as a carrier of disease to man, and others working with these hides, though bitten, did not suffer.

[The strain of Proteus may have been defective.]

P. W. B–S.

## BERIBERI.

SHIGA (K.). **Prophylaxis of Kakke (Beri-Beri) and on Kakke of the Chosenese.**—*Japan Med. World.* 1926. Mar. 15. Vol. 6. No. 3. pp. 59–62.

The author states that he commenced his investigations on beriberi in 1908 to determine whether the disease was due to an infection or intoxication. He made elaborate bacteriological examinations of the intestinal contents, testing these by agglutination and complemental fixation methods, but obtained no definite results. He then went on to feeding experiments as recommended by EIJKMAN, whose conclusions he confirmed. He describes the work of TERUUCHI, SUZUKI, KUMAGAWA and others in the Japanese Navy. From twenty years work he draws the conclusion that the disease is due to metabolic disturbances caused by the absence of vitamin B, and is not one of infection or intoxication. This statement from so great an authority in Japan is of very great interest and importance, but he states that "it is conceivable that some minor deviating signs may occur owing to the individual disposition or as the consequence of other complications."

For prophylaxis the use of undermilled rice and wheat should be widely advocated by means of public education and by propaganda, and the use of polished rice should be restricted. He states also that the methods of cooking the vitamin B containing foods should be improved. From a prophylactic point of view it is immaterial whether or not beriberi is identical with vitamin B deficiency disease (viz., the avitaminosis of birds).

He gives a description of a number of dietary experiments made on Chosenese prisoners in the Government general mental hospital. These people (Koreans) are generally believed to be free from beriberi, so they were specially suitable for the experiments, but it is noted that as rice has become more usual in their diet beriberi has increased in frequency, and the increase is most marked among those who come into the towns as students, or work in the mines with the Japanese. A great increase in number of cases was also noticed after the earthquakes in 1923, probably due to the privations and exposure so caused.

P. W. Bassett-Smith.

COUTO (Miguel). Betrachtungen und Erfahrungen ueber Beriberi und Malaria. [**Observations and Experiments on Beriberi and Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. July 1. Vol. 30. No. 7. pp. 275–284.

The author states that the Brazilian medical men do not generally accept the food deficiency theory of beriberi, rather considering that it is an infectious sickness. In the North and South of Brazil the same kind of rice is used, yet beriberi is fairly common in the North and unknown in the South, and even in the North it tends to be localized in places and buildings. The best treatment is to remove the patient from the endemic area; change of diet without this is of no use, and it is considered that if the patient returns to the area, even if he does not use rice, he will probably suffer again. In the Navy the same irregularity of occurrence is noted though the rice used is the same, and in the Army experience confirms their belief in its infectiousness.

Prof. FRAGA carried out a test on prisoners using a vitamin B deficient diet; neither prisoners or controls contracted beriberi. The general conclusion of the majority of the Brazilian doctors is that "while they do not deny that a diet of polished rice may produce a disease with symptoms of beriberi, they believe that the disease which they have called by this name is one which can be nothing else but an infectious disease."

P. W. B–S.

i. BERNARD (Noel). Réaction de déviation du complément dans le béribéri humain. [**Complement Deviation in Beriberi.**]—*Bull. Soc. Path. Exot.* 1926. July 7. Vol. 19. No. 7. pp. 575–582. [1 ref.]

ii. PONS (R.) & BOREL (E.). Recherches sur l'étiologie du béribéri, au cours d'une épidémie survenue sur une plantation en Cochinchine (juillet-décembre 1925). [**Etiology of Beriberi. Epidemic in a Cochinchina Plantation.**]—*Ibid.* pp. 620–644. [1 ref.]

i. The author advocates the use of *B. asthenogenes* as an antigen in a complement fixation test for human beriberi on the grounds of its specificity previously brought forward by him, and he states this test will differentiate the various forms of polyneuritis found in tropical and subtropical climates from true beriberi. He also suggests that this should be the line of research for the next Congress of the Society of Far East Tropical Medicine, with regard to beriberi. He employed the technique of CALMETTE & MASSOT, using guineapig serum for the complement, and sheep cells for the test. In practice the cases are divided into sporadic, the ordinary form, and epidemic outbreaks treated in hospital. In the former 70 72 per cent. of 69 beriberi patients gave positive reactions; of the other cases 10 per cent. reacted positively and 90 per cent. were negative.

ii. In the epidemic, stated to have been undoubtedly beriberi, recorded by Pons & Borel, occurring in plantations of Suzannah An-loc and Cam-Tien, near Saigon, of 23 cases 9 were positive before the appearance of paralysis and 11 were negative; of 22 cases after paralysis 17 were positive and 3 were negative, the reaction disappearing before death. These plantations are of recent origin and are mostly recruited from Annam, the coolies being often debilitated by malaria. They all received the same form of rice with occasionally fish, pork and fresh vegetables and fruit.

Out of 257 coolies there were 65 cases with 21 deaths. Details of 10 cases are given, all of which were fully investigated. The increase of positive reactions in parallel with the occurrence of the nerve signs, so say the authors, substantiates the intestinal toxic infectious origin of human beriberi as described by Noel Bernard.

P. W. B–S.

JANSEN (B. C. P.) & DONATH (W. F.). Over het isoleeren van antiberiberi-vitamine. [**The Isolation of Anti-Beriberi Vitamin.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 4. pp. 573–574.

The importance of this subject justifies a somewhat detailed summary of this short preliminary report. For the biological standardization of their preparations the authors used a small bird, *Munia maja*, which,

with few exceptions, shows symptoms of polyneuritis after 9 to 13 days feeding with washed, polished rice. Addition of 5 per cent. of rice polishings (rice-bran) lengthens this period to from 15 to 23 days whilst 10 per cent. affords protection for at least 28 days.

The process of concentration is as follows. Rice-bran is extracted with very dilute acid and the extract treated with "acid clay" (*cf.* Seidell, 1916) on which the vitamin is adsorbed and from which it can be liberated by the addition of baryta, yielding a solution from which the baryta is removed by neutralization with sulphuric acid. The filtrate from the precipitated barium sulphate is mixed with silver sulphate or nitrate and enough baryta to make the pH 3·5. The inactive precipitate thus produced is filtered out and the pH of the filtrate raised to 6·5 by the addition of more baryta when a precipitate rich in vitamin is formed. This is collected, dissolved in hydrochloric acid, the vitamin reprecipitated by phosphotungstic acid and recovered by the use of baryta, excess of the latter being removed by neutralization with sulphuric acid. The filtrate, after acidification with hydrochloric acid is evaporated to dryness, the residue taken up in absolute alcohol and the vitamin precipitated as a crude platinichloride from which by the use of hydrogen sulphide it is regenerated as the hydrochloride. The latter is then recrystallized from a mixture of dry alcohol and acetone until pure. The base appears to have the composition represented by the formula $C_6H_{10}ON_2$, and it seems to be the vitamin itself since 1 part of it in 500,000 parts of washed polished rice protects *Munia maja* against polyneuritis.

[It is interesting to note that among numerous other workers also engaged in the task of isolating the anti-neuritic vitamin KINNERSLEY and PETERS in Great Britain (*Biochem. Jl.*, 1925, Vol. 19, p. 820) have obtained from yeast a concentrate of the vitamin, which is claimed to be protective for pigeons in daily doses of 0·084 milligramme.—T. A. Henry.]

W. J. Bais.

SUZUKI (Tadashi). **Position of the Diaphragm as a New Feature in the Cardiac Type of Infant Beriberi.**—*Oriental Jl. Dis. Infants.* 1926. Oct. Vol. 1. No. 4. English summary pp. 91–102. With 18 figs. [In Japanese.]

The author states that in many years experience in the infant clinic at Kyoto he always finds enlargement of the heart in beriberic infants, particularly affecting the right side. The X-ray examinations show that in the cardiac type the diaphragm is considerably depressed (two ribs) and returns to normal in convalescence. In atrophic cases the depression is negligible. The author theorizes that this depression is primary and causes a negative pressure within the pleura; this again causes congestion in the lungs, and then follows the hypertrophy of the right heart.

P. W. B–S.

MONTES (José E.). El agente etiológico del beriberi. [**The Causal Organism of Beriberi.**—*Los Progresos de la Clinica.* Madrid. 1926. Vol. 34. No. 2. 31 pp. With 1 coloured plate & 19 text figs. [9 refs.]

Beriberi is a very prevalent disease in the Philippines and the infantile form is responsible for many deaths. The author, examining adult

patients, found in many of them a little pleural exudate; he was able to withdraw 2–3 cc. from the majority, and in one case as much as 18 cc. In smears made from this fluid he found certain bacilli, and was able to cultivate them aerobically. From the bodies of children recently dead of the disease he obtained the same organism and found that it conformed to the morphology and reactions of *B. mycoides* or *B. mesentericus*.

Experimentally inoculated into monkeys and into cats the organisms caused death with conditions similar to those found in the children; in particular, haemorrhages in the lungs, liver, spleen and heart.

A vaccine was prepared and standardized to contain 1,000 million per cc. This was injected in doses of 0·25–0·5 cc. as the initial dose for children, double this for adults, later injections for the latter being raised to 1·5 cc.

The author states that records of 400 cases so treated showed that 72 per cent. were cured and 18 improved. Administered to women in pregnancy it proved very successful as a preventive of infantile beriberi.

[As no controls were made the value of the treatment must be considered doubtful.—P. W. B–S.]

H. Harold Scott.

## SCURVY.

v. Hahn (F. V.). Ueber einer Ursache des Ausbruchs von Skorbut. [**A Cause of the Outbreak of Scurvy.**]—*Deut. Med. Woch.* 1926. July 30. Vol. 52. No. 31. p. 1300. [4 refs.]

The first part of the paper refers to the author's earlier work in which he pointed out that vitamin C was probably not a definite chemical compound, but depended for its action on the colloidal condition of the food, and a table is given in which the "vitaminoidal" values of different foods are stated. Some of the most valuable substances demonstrated by him are coffee and alcohol, which are not effective on experimental animals. He mentions that patients on deficiency diets may sometimes live many years without clinical signs and then suddenly haemorrhages, etc., may come on, without apparent change in the diet. He concludes from his experiences that the protective agents are present in the fluids rather than in the solids of food. Two cases out of many are quoted; in one the morning coffee was stopped, in the other the alcohol, which the man was in the habit of taking in excess, was cut off. In each case stomatitis and haemorrhages with pain were the clinical evidences. His contention does not appear to be proved as many other factors might have influenced the results.

P. W. Bassett–Smith.

Chahovitch (X.). Métabolisme énergétique au cours du scorbut expérimental. Etude du quotient métabolique. [**Metabolism in Experimental Scurvy.**]—*C.R. Acad. Sci.* 1926. June 7. Vol. 182. No. 23. pp. 1406–1408.

As the symptoms of scurvy develop in guineapigs the animals' metabolism measured at their own body temperature gradually rises till it is about doubled, while the metabolism measured at 1°–2° C. remains fairly constant throughout the course of the disease. This change in the metabolism can be expressed in terms of the "metabolic quotient" of Giaja, which is $\frac{\text{metabolism at low temperature}}{\text{metabolism at normal temperature}}$; this quotient in the case of healthy guineapigs is round about 3·6, while in the scorbutic animals it falls to 1·7 or even lower. The author with Giaja has previously shown that the injection of adrenalin to rats causes a diminution of this quotient. It is also known that in scurvy guineapigs the suprarenal capsules are hypertrophied and the thyroids enlarged. The hypothesis is suggested that the metabolic rise in experimental scurvy is due to the hyper-activity of the suprarenal capsules and the thyroids.

P. W. B–S.

## KALA AZAR.

ANDERSON (Ch.). Chronique des leishmanioses en Afrique du Nord. [**Leishmaniasis in North Africa.**] *Rev. Tunisienne Sci. Méd.* 1926. Mar. 8 pp. With 2 maps in text.

This paper gives an account of the known distribution of kala azar and oriental sore in Tunis, Algeria, Morocco and Tripoli. Of the 75 cases of kala azar from Tunis all, with the exception of one which occurred in the southern district of Degache, were from the northern area and were related to the distribution of the Italian inhabitants. Canine kala azar was found in 2 per cent. of the dogs of Tunis. In Algeria the 8 proved cases were more irregularly distributed, while the dogs of Algiers have been found infected to the extent of 7 per cent. In Morocco 2 cases have been reported, while dogs are said to show a high percentage of infections. In Tripoli a case has been recorded, but precise statistics are wanting. The question of canine kala azar in this country is doubtful. As regards oriental sore, this has been recorded from all four countries. In Tunis the disease, with the single exception of a case reported from the northern area, is limited to the southern districts, particularly Gafsa. In Algeria and Morocco the distribution is more irregular. According to the view expressed by SERGENT the density of the transmitting fly possibly accounts for the distribution. The paper contains a table and maps showing the details of the distribution of the two diseases.

C. M. Wenyon.

ARTAMONOV (A. S.). Au sujet de la propagation du leishmaniose visceral (kala-azar) à Samarcande et du traitement de cette maladie par le stybenile.] [**Kala Azar at Samarcand: Treatment by Stibenyl.**] *Russian Jl. Trop. Med.* 1926. Nos. 6 7. pp. 35–40. [In Russian.]

During the last two years (1924 1926) 138 cases of kala azar were recorded in Samarkand (Turkestan). Children under 11 years of age were chiefly affected, the maximum number of cases being between the ages of one and three years. The death rate was very high (over 58 per cent.). In treatment antimony preparations gave the best results and were superior to neosalvarsan.

C. A. Hoare.

PATTON (W. S.) & HINDLE (Edward). **Notes on Kala Azar in Shantung.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 379–384. With 1 text fig. [4 refs.]

The authors have examined the records of the hospital of the Shantung Christian University Medical School for the 6 years following July, 1920, with reference to 301 patients admitted for kala azar. The information obtained is summarized in the paper. The age incidence is similar to that mentioned by YOUNG (this *Bulletin*, Vol. 21, p. 249). The majority of the cases were males and, even allowing for the fact that females are less likely to be brought to hospital, it appears that the disease is actually commoner amongst males. The figures relating to the months of onset give no evidence of any seasonal incidence of the disease. The mean duration of the disease is 1 to 2

years and is thus longer than that of the disease in Assam. Some patients gave statements indicating a duration of symptoms up to 15 years. In Shantung the disease is specially prevalent in country villages. It is not evenly distributed throughout the province. One village may be infected and a neighbouring one free from infection. In its endemic nature and the occurrence of occasional epidemics there is a resemblance to Indian kala azar. In the survey of a village, Chen Li Chia, the distribution of the cases, which is shown on a map, did not indicate any site infection.

C. M. W.

PARADISO (F.). Sulla distribuzione altimetrica del Kala-Azar infantile in provincia di Catania e sulla età dei piccoli leishmaniotici. [**The Distribution in Altitude of Infantile Kala Azar in Catania and the Age of the Children Affected.**]—*Pediatria.* 1926. June 15. Vol. 34. No. 12. pp. 664–668. [3 refs.]

The province of Catania in Sicily appears to be the most important endemic centre of kala azar in the Mediterranean basin, for the total of 118 cases of the disease recognized during the period 1910–1915 has been increased in the succeeding 10 years to 1,424, all of them diagnosed by the discovery of the parasite. The topography of the province with its sea-board which rises rapidly along the slopes of Mount Etna affords an excellent opportunity of studying the effects of altitude on the incidence of kala azar. Cases have been noted at Aci Trezza, which is only 5 metres above sea level, and also Centuripe and Nicolosi which are 733 and 698 metres respectively. The incidence, however, is greater at the low-lying places and Catania at 38 metres has yielded 1,164 cases. The cases recorded from the various localities and the altitudes are given in a table. It has to be remembered, however, that the greater the distance from Catania, where there is a kala azar dispensary, the less probability is there that children will be brought for treatment.

Another point which is emphasized is the fact that the disease is not exceptional during the first months of life, as illustrated by the following table :—

| *Ages.* | *Cases.* |
|---|---|
| From 1 to 6 months ... ... | 21 |
| ,, 6 ,, 12 ,, ... ... | 168 |
| ,, 1 ,, 2 years ... ... | 694 |
| ,, 2 ,, 3 ,, ... ... | 248 |
| ,, 3 ,, 4 ,, ... ... | 116 |
| ,, 4 ,, 5 ,, ... ... | 46 |
| ,, 5 ,, 10 ,, ... ... | 46 |
| ,, 10 ,, 15 ,, ... ... ... | 7 |
| Age not determined ... ... | 78 |
| Total ... ... ... | 1,424 |

The 21 cases occurring during the first six months of life are distributed as follows : 1–2 months, 1 ; 2–3 months, 1 ; 3–4 months, 1 ; 4–5 months, 5 ; 5–6 months, 13. It is evident that infection may occur during the first month of life.

C. M. W.

LEGER (Marcel). Liens de parenté des divers leishmania. [**Relationship of the Leishmanias.**] *Rev. Prat. Malad. des Pays Chauds.* 1926. Feb. Year 4. Vol. 5. No. 10. pp. 439–445. [13 refs.]

The author reviews the experiments which have shown that local lesions may result from cutaneous inoculation with *Leishmania donovani* and generalized infections from intraperitoneal inoculations with *Leishmania tropica*. These results indicate the close relationship of the two parasites. Without further work it cannot be stated that the two are actually one species or that the one is merely a more virulent form of the other, but the experiments do indicate that the ancestors were very nearly related.

C. M. W.

SHORTT (H. E.), BARRAUD (P. J.) & CRAIGHEAD (A. C.). **The Life-History and Morphology of** *Herpetomonas donovani* **in the Sandfly** *Phlebotomus argentipes*.—*Indian Jl. Med. Res.* 1926. Apr. Vol. 13. No. 4. pp. 947–959. With 5 plates (4 coloured) & 1 text fig. 6 refs.

In this paper, which is well illustrated with coloured plates, the authors describe in detail the various changes undergone by the parasite of kala azar after its ingestion by the sand fly. There is at first a growth of the parasite followed by the development of a flagellum and other changes which culminate in the formation of the elongate flagellate leptomonas. Commencing with the unchanged parasite which is regarded as the first type five different types of organism are recognized, the 5th being the elongate form. Type 2 is the enlarged parasite without a flagellum, type 3 the stumpy or rounded flagellate form and type 4 the immature or "larval" flagellate. Types 3, 4 and 5 occur at all stages of development after their first appearance and they all multiply actively. The shorter types are mostly in close association with the walls of the spaces in which they occur. The most advanced forms as regards their situation in the fly are the flagellates of type 5. The course of development in the fly appears to be an accurate recapitulation of that previously observed in N.N.N. culture medium.

C. M. W.

SHORTT (H. E.), BARRAUD (P. J.) & CRAIGHEAD (A. C.). **Note on a Massive Infection of the Buccal Cavity of** *Phlebotomus argentipes* **with** *Herpetomonas donovani*.—*Indian Jl. Med. Res.* 1926. Oct. Vol. 14. No. 2. pp. 329–330. With 1 plate. [2 refs.]

Further experiments on the development of *Leishmania donovani* in *Phlebotomus argentipes* have resulted in the finding of flagellates in one fly in a still more anterior position than that described in the previous paper by the authors (this *Bulletin*, Vol. 23, p. 573). The fly in question, which had had two feeds and was examined on the 9th day after the initial one, was found to have a massive growth of flagellates extending forwards from the proventicular growth in an unbroken column throughout the length of the pharyngeal and buccal cavities until it reached the mouth proper where the biting appendages take origin, the most anteriorly placed flagellates extending even beyond this situation. The most anterior part of the growth was

anterior to the salivary pump so that it appears certain that such a fly could not fail to infect the wound made if it fed a third time. The infection of the fly, especially in its most anterior part, consisted chiefly of elongate flagellates and not of rounded forms which have been assumed by some to be the infective forms. The paper is illustrated by a camera lucida drawing of a longitudinal section of the fly showing the extension of the flagellate infection.

C. M. W.

SHORTT (H. E.), BARRAUD (P. J.) & CRAIGHEAD (A. C.). **The Occurrence in Nature of *Phlebotomus argentipes* infected with a Flagellate Morphologically Identical with *Herpetomonas donovani*.** —*Indian Jl. Med. Res.* 1926. Oct. Vol. 14. No. 2. pp. 521–522. [2 refs.]

A fly caught in a kala azar house on the evening of July 26, 1926, was seen to contain the remains of a blood meal. It was kept till the morning of July 29th, when it was found to be dead. When dissected it revealed a heavy infection with flagellates which showed a massive grouping in the region of the proventricular fold. There was no extension beyond this point anteriorly. The type of infection and the character of the flagellates represented a reproduction of the conditions seen in experimentally-infected flies. This fly taken at the village of Bakhtiapur, about a mile and three-quarters to the north of the Pusa Estate in Bihar, represents the first natural infection to be found.

C. M. W.

YOUNG (Charles W.) & HERTIG (Marshall). **The Development of Flagellates in Chinese Sandflies (Phlebotomus) fed on Hamsters infected with *Leishmania donovani*.** *Proc. Soc. Experim. Biol. & Med.* 1926. Apr. Vol. 23. No. 7. pp. 611–615. [5 refs.]

The sandflies of North China are three species of *Phlebotomus*. One is *P. major* var. *chinensis*, the others are undetermined, and are designated *P.* "*B*" and *P.* "*C*." Flies collected in kala azar houses and elsewhere have been examined for flagellates and flies bred in the laboratory have been fed on kala azar cases and employed for transmission experiments.

A total of 378 females and 48 males of *P.* "*C*" were all found free from flagellate infections. Of 373 which had fed on kala azar cases and infected hamsters 7 were found to be infected. These positive flies were dissected as follows: 4 on the 3rd day, and 1 each on the 4th, 5th and 8th days. The positive flies were amongst those which had fed only on infected hamsters.

The dissection of 72 wild *P. major* var. *chinensis* yielded no flagellates. Of 34 of these flies fed on striped hamsters 29 were found infected with flagellates. They occurred chiefly in the oesophagus or anterior portion of the mid-intestine and occasionally in the oesophageal diverticulum. The positive flies were dissected from 4 to 8 days after the infective feed.

As regards *P.* "*B*" a dissection of 21 yielded no result. Attempts to feed over 70 of these flies were unsuccessful.

Sandflies reared in the laboratory were fed on kala azar cases and on heavily infected hamsters. These flies were then fed on uninfected

hamsters and a certain number were inoculated into the animals. Of a total of 250 hamsters used in these experiments all have proved negative on liver puncture made from 81 to 137 days after the attempted transmission. The autopsy findings will be reported later.

[PATTON and HINDLE in their paper on the sand flies of N. China point out that *Phlebotomus* "C" is a variety of *P. sergenti* Parrot var. Newstead and *Phlebotomus* "B" a new variety of *P. perturbans*. (*Proc. Roy. Soc.* Ser. B. Vol. 100, p. 405.)]

C. M. W.

NICOLLE (Charles) & ANDERSON (Charles). Recherches expérimentales sur le mode de transmission du kala azar. Quatrième série d'expériences. **Experiments on the Mode of Transmission of Kala Azar.**]—*Arch. Inst. Pasteur de Tunis.* 1926. June. Vol. 15. No. 2. pp. 114–117. [1 ref.]

With a view to testing the possible transmission of kala azar by way of the alimentary tract a young dog and a heavily infected dog were kept together free from ectoparasites for 3 months. No infection resulted. Another very young dog was made to ingest with its milk daily for a similar period the faeces from heavily infected dogs. The result was the same and the authors concluded that canine leishmaniasis does not appear to be contracted by way of the digestive tract. It is pointed out that the virus employed in these experiments was a naturally occurring canine one and that it has been carried on in dogs by subinoculations to its twelfth passage, since its isolation on December 19th, 1922.

C. M. W.

SHORTT (H. E.), BARRAUD (P. J.) & CRAIGHEAD (A. C.). *Conorhinus rubrofasciatus*, **de Geer, and Indian Kala-Azar.**—*Indian Jl. Med. Res.* 1926. July. Vol. 14. No. 1. pp. 239–242. [3 refs.]

In the experiments described 165 specimens of *Conorhinus rubrofasciatus* in various stages of development were fed on cases of kala azar. In no instance were developmental forms of *Leishmania donovani* discovered when the bugs were dissected.

C. M. W.

MAZZA (Salvador). Leishmaniosis tegumentaria y visceral. [**Dermal and Visceral Leishmaniasis in Argentina.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 13. pp. 209–216. With 27 figs. on 14 plates.

The paper deals with various aspects of the question of leishmania infections in the Argentine and appears to be a summary of the observations reported in the several papers reviewed in this number of this *Bulletin*. In addition to the dog noted in another paper a second one is described which had large ulcers on the flank. In these also leishmania were demonstrated. As regards the transmission of the parasite it is noted that suspicion rests on the sand fly, which is represented by a species allied to, if not identical with, *Phlebotomus verrucarum*.

C. M. W.

MAZZA (Salvador) & ARIAS (Jorge Cornejo). Primeros casos autóctonos de kala-azar infantil comprobados en el norte de la República (Tabacal y Orán, Salta). **First Cases of Kala Azar contracted in Argentina.**—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. No. 11. pp. 140–144. With 3 text figs.

—— & ——. Premiers cas autochtones de kala-azar infantile en Argentine.—*C.R. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. p. 816.

Two cases of kala azar in children aged 5 and 9 years are recorded. These are the first autochthonous cases of the disease to be described in Argentina. The first case was at Oran (Salta) and the second at Tabacal. Leishmania were found by spleen puncture in the first case but not in the second ; owing to its failure to react to intensive quinine treatment and the response to injections of tartar emetic there appears to be little doubt about the diagnosis. It is noted that many emigrants from endemic centres of kala azar in the Mediterranean districts come to the country and though a case has been seen previously in a child from Catania the two children mentioned are the first to have contracted the disease locally.

C. M. W.

NAPIER (L. Everard). **The Pentavalent Compounds of Antimony in the Treatment of Kala-Azar. I. Stibosan (von Heyden 471); an Analysis of the Results of the Treatment of the First 104 Cases.** – *Indian Jl. Med. Res.* 1926. Oct. Vol. 14. No. 2. pp. 263–279. With 1 text fig. [4 refs.]

The author analyses in detail the facts concerning the treatment of the 104 cases mentioned in the title with special reference to the quantity of drug which should be administered to effect a cure. The chief difficulty is to determine whether cure has taken place or not, since there is no infallible test that can be applied after a course of treatment has been completed. Experience has shown that when relapses occur they do so within 2 months, so that it is concluded that cure is absolute if no relapse has occurred within 6 months. Of the 104 cases treated 90 were discharged from hospital as cured, 2 failed to respond to treatment, 11 died and 1 did not complete the course. The 11 fatal cases were, with one exception, in very poor condition when treatment commenced. Of the 90 cases discharged as cured 77 were traced 6 months later. Of these 70 had remained in good health, while 7 had relapsed. In the majority of cases a final test was made at the end of treatment. This was either blood culture, spleen puncture culture or liver puncture culture. In 71 cases in which one or other of these tests gave a negative result relapse occurred in 4. Of 2 cases which were positive to liver puncture culture the final result was a cure while in 1 case which was positive to spleen puncture culture there was relapse. Of 3 cases discharged without any test of the kind 2 relapsed. It thus appears that though such a final test may reveal parasites ultimate cure may take place. Of 4 clinical signs of the action of the drug, viz., cessation of fever, diminution in size of spleen, improvement in the leucocyte count and increase in weight, the first is the most important. If those patients who were febrile or afebrile throughout the course are left out it is seen that the relapse rate was 5 per cent. in those cases in which fever ceased before

the 6th injection, 12·8 per cent. in those in which it persisted after the 6th injection, and 30·8 per cent. in those in which it persisted up to the 8th injection. Though reduction in size of the spleen is an important point it cannot be accepted as a determining factor in considering whether a patient is cured or not. As regards the leucocyte count the only deduction that can be drawn is that a count of 8,000 or over is an indication of cure, but the converse cannot be argued. It may be concluded that a substantial increase in weight of, say, 7 lb., may be looked upon as a point in favour of assuming that a patient is finally cured.

After a trial of various methods of administering the drug it was decided to give 0·2 gm. as the initial dose and 0·3 gm. on each occasion subsequently. The injections were given intravenously three times weekly, in most instances in a 5 per cent. solution. Of the 77 patients who were discharged as cured and who were traced 69 received from 10 to 15 injections. The majority of patients over 15 years of age received a total of about 3 gm. of drug. It is concluded that a satisfactory dose for an initial course would be 3·5 gm. After this a relapse rate of 9 per cent. could be expected and this could be reduced to 2 per cent. by giving the relapsed cases a second course of 6 gm., or to 1 per cent. by giving a course of 10 gm. The author points out that he formerly had the impression that an insufficient initial course made a patient more resistant to subsequent treatment. He now thinks there is no evidence in favour of such an assumption. The mere fact that they were not cured after the first course is an indication that they were already resistant to a certain degree before any treatment was instituted. When a patient returns for treatment immediately after symptoms recur, usually within 2 months after discharge, a course of treatment shorter than the original course will often bring about a cure.

C. M. W.

STRUTHERS (E. B.). **The Advantages of the Organic Preparations of Antimony in the Treatment of Kala-Azar. A Preliminary Note.**—*China Med. Jl.* 1926. Sept. Vol. 40. No. 9. pp. 849–850.

The note draws attention to the fact that organic antimony compounds are superior to the tartrates in the treatment of kala azar and mentions Stibamine glucoside, "Neostam," Von Heyden "471," Stibosan and Von Heyden "661," Antimosan as being the most valuable of those obtainable in China. The last named is not so effective as the others, but has been found of value in the treatment of very severe cases.

C. M. W.

SMYLY (H. Jocelyn). **Chemotherapy of Experimental Leishmaniasis in Hamsters.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 104–110. With 1 text fig. [11 refs.]

The paper describes the treatment in China of hamsters experimentally infected with *Leishmania donovani* by various drugs—tryparsamide, sodium and potassium tartrobismuthate, ethyl hydrocarpate and

sodium antimony tartrate. In no case was an infected hamster cured, but it was noted that there had been produced some reduction in the weight of the spleen.

C. M. W.

DUNLAP (A. M.). **Chronic Laryngeal Stenosis complicating Kala Azar and Diphtheria.**—*China Med. Jl.* 1926. May. Vol. 40. No. 5. pp. 409–415. [5 refs.]

Two cases of laryngeal stenosis necessitating the introduction of the laryngeal tube occurred in two children undergoing treatment in hospital for kala azar. In the first case it was not possible to remove the tube for more than ten to twenty minutes at any time during a period of about 6 weeks. In the second case, in which the stenosis was not so severe, the tube was kept constantly in use for two weeks and more irregularly for one week. In both cases the condition of stenosis passed off.

C. M. W.

MAYER (Martin). Empfänglichkeit des europäischen Hamsters (*Cricetus frumentarius*) für Kala-Azar. (**Susceptibility of the European Hamster to Kala Azar.**)—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Aug. 1. Vol. 30. No. 8. pp. 347–348. [1 ref.]

The reports relative to the susceptibility of the N. China hamster to inoculations with *Leishmania donovani* led the author to test the European hamster from this point of view. Three were inoculated with liver puncture material and two with cultural forms from the same case. One of the first three was killed after 6 weeks and found to be uninfected. One of the culture-inoculated animals died with a very heavy infection of the organs on the 159th day. Liver puncture of the remaining 3 animals showed that they also were infected. Two which had been inoculated with liver puncture material died of haemorrhage on the 273rd day and were found to have a very intense infection. It is evident that the European hamster is very susceptible to inoculations with *Leishmania donovani*, and may serve as a useful animal for therapeutic investigations in Europe.

C. M. W.

HINDLE (Edward) & PATTON (W. S.). **Experiments bearing on the Susceptibility of the Striped Hamster** (*Cricetulus griseus*) **to Leishmania of Chinese Kala Azar.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 374–379. [4 refs.]

Infection experiments with non-flagellate and flagellate stages of leishmania were made with striped hamsters. By the percutaneous and subcutaneous methods of inoculation of non-flagellate stages no infections were produced. Subsequent inoculation of the animals intraperitoneally led to infection, thus proving that the previous futile inoculations had not produced immunity. With flagellate stages infections resulted from all three methods of inoculation, but in all cases the intraperitoneal route was the one of choice. The intensity of the infection varied with the dose of virus employed.

C. M. W.

HINDLE (Edward), HOU (P. C.) & PATTON (W. S.). **Serological Studies on Chinese Kala Azar.** *Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 368–373. [17 refs.]

In the case of Indian strains of leishmania there is general agreement that normal human serum is inimical to the cultural forms of the organism. This property of the serum is destroyed by heating it to 55° C., so that it would appear that the action depends on the presence of complement. The authors have found that the Chinese strain of leishmania is similarly affected by serum, which loses its property of damaging the flagellates when heated to 55° C. for 30 minutes. Cerebrospinal fluid, which contains no complement, was without action. The test was conducted by mixing cultural forms of the parasite with serum and observing the result. It was found, however, that though by direct observation all the flagellates seemed to be destroyed, on staining films of the mixture certain flagellates appeared to have been uninfluenced by the serum. It would appear, therefore, that the flagellates in cultures must possess biological differences.

It might be urged that the destructive power of serum is an indication that the natural infective stage of the organism is not the flagellated one, but observations noted above and the fact that hamsters can be infected by injection of the flagellated stage leaves this doubtful. It was noted that there was no increase in the complement of the serum in kala azar.

With an antigen prepared from the spleens of heavily infected hamsters the complement fixation test was carried out in 24 cases of kala azar. In 19 a well-marked reaction was obtained. In 5 cases there was only a partial reaction, but in these the haemolysis was less than in the controls. Three cases successfully treated with tartar emetic gave a negative reaction.

C. M. W.

HINDLE (Edward) & PATTON (W. S.). **Resistance of Leishmania Cultures to Cold.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 385–386.

It was determined that cultures of leishmania were still viable after intermittent exposure to temperatures of —12° C. for a period of at least 10 days. It would seem possible that in the alimentary tract of a hibernating insect the flagellates would be able to persist throughout the winter.

C. M. W.

WAGENER (Edna Hannibal) & KOCH (Dorothy Ann). **The Biological Relationships of Leishmania and Certain Herpetomonads.** - *Univ. California Public. Zool.* 1926. Mar. 16. Vol. 28. No. 20. pp. 365–388. With 53 figs. on 4 plates. [26 refs.]

The investigations reported in this paper are, as far as agglutination phenomena are concerned, similar to those of KLIGLER and NOGUCHI (this *Bulletin*, Vol 21, p. 726, Vol. 23, p. 581 and Vol. 22, p. 692). In this case the antigen employed consisted of a suspension of dead flagellates in 0·9 per cent. sodium chloride solution. This antigen was put up against the sera of rabbits which had received injections of cultures of *Leptomonas ctenocephali* and various species of *Leishmania*. The

results showed that there was no biological relationship between *Leptomonas ctenocephali* and the species of *Leishmania*, but the five strains of the latter all showed marked group reactions in the presence of antisera of any member of the genus.

Rabbits sensitized to any strain of *Leishmania* give positive skin reactions to antigens of all of the group. No intradermal reaction was obtained with antigens of *L. ctenocephali* or *Trypanosoma lewisi*. Guineapigs may also be sensitized to both *Leishmania* and *Leptomonas*. The skin reaction was considered positive when there appeared a red indurated area 4 to 5 mm. in diameter at the end of 24 hours, which reached its height at 48 hours. A coloured plate illustrates the character of the reactions.

Attempts to infect mice with *Leishmania*, *Leptomonas ctenocephali* and flagellates from the box-elder bug (*Leptocoris trivittatus*) and the water-strider (*Hygrotrechus* sp.) were not successful. Similarly, failure attended the efforts to infect the local field mouse (*Peromyscus maniculatus sonoriensis*) with *Leishmania*.

Examinations of cultures of *Leishmania* and *Leptomonas ctenocephali* at different stages of growth have led the authors to believe that the flagellates pass through definite cycles. Round forms at first appear, and these become the elongate flagellates which later revert to the round forms again. *Leishmania* requires from 21 to 30 days to complete the cycle while *L. ctenocephali* needs only 8 to 10 days.

C. M. W.

NOGUCHI (Hideyo) & TILDEN (Evelyn B.). **Comparative Studies of Herpetomonads and Leishmanias. I. Cultivation of Herpetomonads from Insects and Plants.**—*Jl. Experim. Med.* 1926. Sept. 1. Vol. 44. No. 3. pp. 307–325. With 6 plates. [30 refs.]

——. **II. Differentiation of the Organisms by Serological Reactions and Fermentation Tests.**—*Ibid.* pp. 327–337. [6 refs.]

The investigations recorded in these papers have to do with certain insect and plant flagellates which are very closely allied to those which produce kala azar and oriental sore and belong to the same herpetomonad or, as some prefer to say, leptomonad group. The flagellates of insects and plants belong to twelve strains which have been isolated in pure culture by the use of various media in test tubes and on plates. Four cultures were obtained from latex-feeding insects (*Oncopeltus fasciatus*, *Oncopeltus* sp., *Lygaeus kalmii*), three from latex plants (*Asclepias syriaca*, *Asclepias nivea*), two from mosquitoes (*Culex pipiens*, *Anopheles quadrimaculatus*), one from the house-fly (*Musca domestica*) and two from blue-bottle flies (*Calliphora*). The flagellates have been differentiated chiefly by their biological relationships. Thus, the 7 strains from latex-feeding insects and latex plants represent two distinct species which have been named *Herpetomonas oncopelti* and *H. lygaeorum*. The two strains from mosquitoes were biologically identical and were named *H. culicidarum*. The strain from the house fly contained larger individuals than any other strain and was morphologically distinct from either of the blue-bottle strains. None of the fly flagellates could be identified with *Herpetomonas muscae domesticae* or *H. calliphorae*, so they have been given new names, *H. muscidarum*, *H. media* and *H. parva*. In no case did the cultural forms of the flagellates resemble the naturally occurring ones,

the influence of the nature of the culture medium showing itself in the morphological variations. In a table the detailed measurements of the various species as they appeared in leptospira medium are set out.

In the second paper the serological experiments are described. They were carried out by testing the agglutinating power of immune sera produced in rabbits, as described by NOGUCHI for the differentiation of species of *Leishmania* (this *Bulletin*, Vol. 22, p. 692). In addition to the flagellates mentioned above, cultures of *Leishmania tropica, L. brasiliensis, L. infantum, L. donovani, Herpetomonas ctenocephali* and *Trypanosoma rotatorium* were included in the study. In addition the complement fixation test was used. Furthermore, the capacity of the various flagellates to ferment sugars was tested, and it was found that there was a great variability in the fermentative faculty of different flagellates. The results led to the recognition of the species named above.

C. M. W.

FRANÇA (Carlos). Quelques considérations sur les "Leishmania." **Thoughts on the Leishmanias.** *Mém. et Etudes du Muséum Zool. de l'Univ. de Coimbra.* 1926. Ser. 2. No. 2. 7 pp. With 4 text figs. [10 refs.]

The paper discusses the genera *Leishmania, Leptomonas* and *Herpetomonas*. The first is regarded as a synonym of the last-named. A member of the genus *Leptomonas* is regarded as possessing no rhizoplast, the flagellum arising directly from the blepharoplast. When division occurs the blepharoplast divides and a new flagellum grows out from the daughter blepharoplast. A member of the genus *Herpetomonas* is said to possess a rhizoplast which gives origin to the flagellum. In division both the blepharoplast and the rhizoplast divide, a new flagellum forming from the end of the daughter rhizoplast. Owing to the fact that rhizoplasts, which are duplicated when division occurs, have been demonstrated in the parasites of kala azar and oriental sore they are regarded as belonging to the genus *Herpetomonas*.

C. M. W.

SERGENT (Edm. & Et.), PARROT (L.), DONATIEN (A.) & BÉGUET (M.). Transmission expérimentale du bouton d'Orient (clou de Biskra) à l'homme par *Phlebotomus papatasi* (Scopoli). [**Experimental Transmission of Oriental Sore to Man by** *P. papatasii.*] *Ann. Inst. Pasteur.* 1926. May. Vol. 40. No. 5. pp. 411–430. With 5 text figs. [15 refs.]

In 1921 the authors inoculated crushed *Phlebotomus papatasii* into the skin of a volunteer with the result that a lesion resembling oriental sore and containing leishmania developed (this *Bulletin*, Vol. 19, p. 315 and Vol. 23, p. 584). They now give an illustrated account of the lesion produced and inoculation experiments made with the virus from the sore. The small papule which was noted at the site of inoculation two months and twenty-four days after the application of the crushed sand flies increased progressively in size and eventually became an ulcer. During the 5th month of its development local applications of urotropine were commenced and were continued till a cure at the 7th month was obtained. The photographs

show the lesion at different stages. As regards the parasites, both the forms in smears from the sore and those that developed in cultures were identical with the corresponding forms of *Leishmania tropica*.

With the cultures 6 mice were inoculated intraperitoneally. Five were uninfected, but 1 died after 4 months and 8 days and showed numerous leishmania in the liver, spleen and testicles. Five other mice similarly inoculated failed to become infected. One other mouse was inoculated intraperitoneally and 5 intratesticularly. All these showed swelling and finally ulceration of the scrotal region. When examined there were numerous leishmania in the peritesticular tissues, the liver, spleen, bone marrow, lymphatic glands and in leucocytes of the heart blood. Subinoculations were successfully made from mouse to mouse. With material rich in leishmania from the scrotum of an infected mouse 5 dogs were inoculated intradermally. They all developed local lesions in which leishmania were demonstrated.

In his review (ARAGÃO; this *Bulletin*, Vol. 19, p. 316) of the author's 1921 paper the reviewer stated that it was "just possible, though perhaps improbable, that one or more of the flies had actually fed on a case shortly before they were caught at Biskra." The authors point out that at the time there were no cases of oriental sore either amongst the civil population or the hospital staff. Furthermore, the time of year when the flies were caught was not that in which oriental sore appears. There was thus no possibility that the flies might have fed on a sore as the reviewer suggested.

C. M. W.

PARROT (L.) & DONATIEN (A.). Infection naturelle et infection expérimentale de *Phlebotomus papatasi* (Scop.) par le parasite du bouton d'Orient. [**Natural and Experimental Infection of** *P. papatasii* **by** *L. tropica*.]—*Bull. Soc. Path. Exot.* 1926. Oct. 13. Vol. 19. No. 8. pp. 694–696. [1 ref.]

The authors describe a new and simple method of infecting mice with *Leishmania tropica* and the experimental infection of *Phlebotomus papatasii* from animals infected in this way. To produce infection in a mouse several drops of cultures of *Leishmania tropica* are injected into the skin at two or three points on the tail of an animal. Local infection takes place rapidly, numerous parasites being found at the point of inoculation in 8 or 10 days. As infection extends the tail becomes swollen and may ulcerate. The animals remain in good health, the infection persisting for as much as 11 months.

With mice infected in this way it was decided to attempt infection of sand flies at Biskra. A dissection of 181 wild flies revealed flagellates of the leptomonas type in only one which had been caught in the military hospital where, it is pointed out, there was no case of oriental sore. The flagellates were limited to the stomach of the fly and were most numerous in its anterior part; the hind gut was free from infection. Sand flies were then placed in a cage and infected mice introduced. Of 43 flies subsequently examined 6 were infected. In another experiment flies were permitted to feed only on the tails of the mice; of 29 flies 11 became infected. The flagellates found resembled culture forms of *L. tropica*. The development is rapid, for after 16 hours short flagellate forms can be seen in the blood in the stomach. In 36 hours there are numerous long flagellates often arranged in rosettes. They persist when the blood has been completely digested

at 95 hours. The development is limited to the stomach and especially its anterior part. The temperature at Biskra varied from 27° to 32° C. during the experiments.

C. M. W.

ADLER (S.) & THEODOR (O.). **Further Observations on the Transmission of Cutaneous Leishmaniasis to Man from** *Phlebotomus papatasii.*—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. pp. 175–194. With 3 plates. [8 refs.]

This paper is a continuation of that previously reviewed (this *Bulletin*, Vol. 23, p. 105). During 1925 sand flies from Jericho to the number of 3,850 were dissected and examined for flagellate infections. Of these 3,624 were females of *Phlebotomus papatasii*, the rest being males of this species or males and females of species belonging to the *minutus* group. Only 4 female *P. papatasii* were found infected. In addition 250 sand flies from Jerusalem, 180 from Mozza and 120 from Haifa (all female *P. papatasii*) were examined and found to be uninfected. The morphology of the flagellates, which is described in detail, shows that they correspond fairly closely with the cultural form of *Leishmania tropica*. Taking into account the 3 infected flies previously reported, in 4 of the flies the flagellates were mainly in the stomach, while in 3 they were in the oesophagus, oesophageal diverticulum, mid gut and hind gut. In one they were also found in the pharynx, buccal cavity and proboscis.

The infectivity of the flagellates in the sand flies was proved by inoculation experiments made on three volunteers. Flagellates from flies were inoculated into two scarified areas on the forearm. In all 3 cases lesions containing leishmania developed. In 2 cases after 25 and 35 days respectively papules containing leishmania appeared on the skin. In the 3rd case it was thought that infection had not taken place, but 4 months after the inoculation there appeared a movable subcutaneous nodule which increased in size. It was punctured at the 7th month and was found to contain leishmania.

Experiments conducted with a view to infecting sand flies from sores are described. Of 168 *Phlebotomus papatasii* which fed on the sore 16 were afterwards found infected. The flies used were wild ones, but owing to the low incidence of natural infection it is safe to conclude that the flies had become infected from the sores. With the flagellates which appeared in the flies 11 inoculations were made in 7 volunteers. Of these, 5 inoculations were made with flagellates which had developed 2 days in the flies, 4 with 5-day flagellates, one with 6-day flagellates, and 1 with 7-day flagellates. In no case did infection take place. The authors incline to the view that the failure was due to the flagellates not having reached the necessary stage of development.

C. M. W.

ADLER (S.) & THEODOR (O.). **The Transmission of Cutaneous Leishmaniasis to Man from Artificially Infected** *Phlebotomus papatasii.* [Correspondence.]—*Nature.* 1926. Nov. 13. Vol. 118. No. 2976. p. 692.

Though the authors succeeded in producing oriental sore by noculating volunteers with the naturally occurring flagellates of *Phlebotomus papatasii* they had hitherto failed to reproduce the sore

by inoculation of flagellates from experimentally infected flies on the 2nd, 4th, 5th, 6th and 7th days of infection. Realizing that it was possible that some complete biological cycle might be necessary before the flagellates became infective in the fly, a further series of experiments was instituted. Laboratory-bred flies were fed on a sore produced by the inoculation of the naturally occurring fly flagellates and were dissected on the 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th and 21st days and the flagellates inoculated into volunteers. Up to date, sores have developed in the case of two persons inoculated with 8th day flagellates. Thus a strain of *L. tropica*, for such is the natural flagellate of the sand fly, has been observed through four successive generations of hosts, viz.: (1) Sand fly (naturally infected); (2) Human being infected from (1); (3) Laboratory-bred sand fly infected from (2); (4) Human being infected from (3).

[The authors state that the proof that *Phlebotomus papatasii* is a transmitter of cutaneous leishmaniasis is therefore complete. It has to be remembered, however, that the infections were produced by direct inoculation into the skin. It has yet to be discovered how the sand fly brings about infection in nature. Does it do so by its bite, by being crushed upon the skin, or by the deposit of faeces on the skin, or in some other manner? The matter cannot be regarded as finally settled till the mechanism of natural infection has been determined.]

C. M. W.

ADLER (S.) & THEODOR (O.). **Identity of** *Herpetomonas papatasii* **and** *Leishmania tropica*. [Correspondence.]—*Nature*. 1926. July 17. Vol. 118. No. 2959. p. 85.

In this note the authors recall the fact that they have already reported the successful production of oriental sore in 3 individuals by inoculating them with the leptomonad flagellates from naturally infected *Phlebotomus papatasii*. In view of the fact that NOGUCHI and KLIGLER have both shown that homologous sera can be prepared for the cultural forms of the various species of *Leishmania*, viz., *L. tropica*, *L. donovani* and *L. braziliense*, they decided to apply this test to the leishmania from the experimental sores and the naturally occurring sores. The result of the investigation is that the leishmania from the experimental sore and hence the naturally occurring flagellates of the sand fly are serologically identical with the parasites of the naturally occurring sores of both Palestine and Bagdad.

C. M. W.

LLAMBIAS (Joaquin) & MOSTO (Domingo). Leishmaniosis cutanea americana. Estudio histopatológico. [**American Dermal Leishmaniasis. Histological Study.**]—*Semana Méd.* 1926. Aug. 26. Vol. 33. No. 34. (1702.) pp. 536–539. With 3 text figs.

—— & ——. Etude histo-pathologique de la leishmaniose cutanée américaine.—*C. R. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. pp. 823–824.

An histological examination of the lesions of American cutaneous leishmaniasis reveals the fact that there is a marked proliferation of the Malphigian layer of the skin which results in the formation of pro-

longations into the corion which is converted into granulation tissue which invades the dermis. In many cases the prolongations become disconnected with the Malphigian layer, forming epithelial islets with concentric arrangement of the cells as in epithelioma. The dominant cellular elements are of the lymphocytic or large mononuclear type, while giant cells, eosinophiles and polynuclears are also present. Sometimes the eosinophiles predominate over all other cells.

C. M. W.

JEANSELME (E.). Un cas de bouton d'Orient contracté à Marseille. [**Oriental Sore contracted at Marseilles.**]—*Bull. Acad. Méd.* 1926. July 13. Year 90. 3rd Ser. Vol. 95. No. 28. pp. 56–58.

—— & BURNIER. Un cas de bouton d'Orient.—*Bull. Soc. Française Dermat. et Syph.* 1926. July. No. 7. pp. 479–480. With 1 fig.

The papers describe a case of oriental sore in a Russian sailor who during 1921–1922 was in the Crimea, Turkey and Tunis. He left Tunis on July 15th, 1922, and came to Marseilles. During the whole of 1923 he worked in France and was in the Baltic from January to October, 1924, after which he returned to France. Two months after his return to Marseilles the lesion developed over the left eye-brow. It appears that the infection must have taken place in Marseilles, unless one is willing to admit an incubation period of about 3 years. Many refugees suffering from oriental sore came to Marseilles after the war and they may have been responsible for the spread of the infection. Another case is mentioned of an Armenian who left Aleppo in August, 1924, for France where she developed oriental sore, the lesions of which first appeared in November, 1925.

C. M. W.

WILSON (F. P.) & SHREWSBURY (J. F. D.). **A Report on a Case of Espundia.**—*Brit. Jl. Dermat. & Syph.* 1926. June. Vol. 38. No. 6. (452). pp. 231–241. With 9 text figs.

The paper describes a case of espundia in a man who had resided in Brazil. There was involvement of the nasal and buccal mucosae as also the tissues around the urethral orifice. Active anti-syphilitic treatment carried on for several years did not lead to any improvement. Three intramuscular injections of tartar emetic were given and though the treatment had to be discontinued owing to profound reaction it produced the first definite signs of improvement. After radium and X-ray treatment had been tried further injections of tartar emetic followed by Von Heyden "471" were given. The patient steadily improved and was finally discharged. The remarkable response to antimony treatment justified the diagnosis.

C. M. W.

PUPO (J. Aguiar). Traitement de la leishmaniose des muqueuses par l'éparseno (amino-arséno-phénol de Pomaret). Ses possibilités d'emploi dans le traitement du kala-azar. [**Treatment of Mucosal Leishmaniasis by Eparseno.**] *Bull. Soc. Path. Exot.* 1926. May 12. Vol. 19. No. 5. pp. 331–335.

——. Leishmaniose tegumentar. Epidemiologia, prophylaxia e tratamento da leishmaniose americana.—*Sciencia Med.* 1926. Aug. 31. Vol. 14. No. 8. pp. 387–409. With 2 plates. [15 refs.]

——. Le traitement des leishmanioses par l'amino-arséno-phénol. —*C.R. Soc. Biol.* 1926. Oct. 22. Vol. 95. No. 29. pp. 993–994.

The three papers describe the treatment of S. American leishmaniasis with "eparseno," which is Ehrlich's 592 (di-oxy-di-amino-arsenobenzene). The second paper in addition gives a general review of the subject, with special reference to the various treatments which have been advocated.

The advantages of treatment with "eparseno" is that the drug can be administered intramuscularly. Two cases, both of which had involvement of the nasal and oro-pharyngeal mucosae, were completely cured. The first case was in an infant 14 months old. It received a course of 8 intramuscular injections of 1 to 3 centigrams of the drug. This brought about a marked improvement, a complete cure following a repetition of the course. The second case was completely cured by a course of 15 injections of 12·5 centigrams. A third more serious case has received 2 such courses with a two months' interval. After a similar interval a third course is in progress, and the improvement is so marked that it is safe to predict that a complete cure will be obtained in this case also. The good results obtained warrant a more extensive trial of this method of treatment in S. American and other forms of leishmaniasis.

C. M. W.

MAZZA (Salvador) & BERNASCONI (Vicente). Ensayos de tratamiento de la leishmaniosis tegumentaria americana por el "Bayer 205." (Nota preliminar.) [**Treatment of American Dermal Leishmaniasis by "Bayer 205."**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 96–99. With 2 figs.

Two cases of American leishmaniasis were treated with intravenous injections of "Bayer 205" in doses of half a gramme. One case was given six, and the other five injections. The results obtained are sufficiently encouraging to justify the trial of the treatment in a larger series of cases.

C. M. W.

MAZZA (Salvador) & BERNASCONI (Vicente). Ensayos de tratamiento de la leishmaniosis tegumentaria americana por el Stovarsol sódico por via intravenosa. (Notas preliminares.) [**Treatment of American Dermal Leishmaniasis by Stovarsol.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 112–117. With 6 figs.

Three particularly severe cases of American leishmaniasis which had resisted tartar emetic and other medication were treated with

intravenous stovarsol. After 13 or 14 injections definite improvement was noted. The drug is evidently worth trying on less severe cases with a view to estimating the permanency or otherwise of the results obtained.

C. M. W.

LINDEMBERG (Adolpho). Novos tratamentos antimonaes da leishmaniose cutanea. [**Antimony Treatment of Dermal Leishmaniasis.**]—*Ann. Paulist. Med. e Cirurg.* 1926. May–June. Year 14. Vol. 17. Nos. 5 & 6. pp. 59–60.

In the treatment of cases of South American leishmaniasis in which the naso pharyngeal mucosa is involved, the author has had good results from intravenous injections of a 5 per cent. solution of antimosan in doses of 4 to 8 cc. given 2 or 3 times a week. Of 10 cases treated only one proved refractory. During a period of 7 months 18·4 gm. of antimosan were administered, without producing any untoward results.

C. M. W.

PATERSON (Guillermo). Sobre métodos modernos de tratamiento de la leishmaniosis tegumentaria americana. [**Modern Methods of Treatment of American Dermal Leishmaniasis.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 68–73.

In the treatment of the leishmaniasis of the skin and mucosae in the Argentine the author finds that, though intravenous injections of tartar emetic give good results, it is sometimes advisable to supplement this treatment by local applications and injections of phosphorated oil, as recommended by CASTELLANI for the treatment of oriental sore, and by ionization of the sore, for which an antimony electrode attached to the positive pole of the continuous current is employed by applying it directly to the sore.

Describing the method of transmission both Phlebotomus and Simulium are considered, and it is noted that flagellates of the herpetomonad (leptomonad) type have been found in the latter. Flies fed on sores have so far yielded only negative results.

C. M. W.

RAETZ (Erico). Tratamiento de la leishmaniosis por el yodobismutato de quinina. [**Treatment of Dermal Leishmaniasis by Iodobismuthate of Quinine.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 150–151.

South American leishmaniasis resembles syphilis in that it is a disease which is produced by way of the blood stream. There is a primary chancre-like lesion which becomes transformed into an extensive ulcer. After a variable interval the lesions of the skin of the face and mucosae of the mouth and nose become involved indicating a tertiary stage. As in syphilis, treatment both local and general must be energetically carried out. Injections of tartar emetic having failed to give good results, the author was led to try iodobismuthate of

quinine which was administered by daily injections of 0·15 gram during one month. This gave better results as regards the mucosal lesions and completely cured the cutaneous ulceration of the legs.

C. M. W.

TRUFFI (M.). Sulla leishmaniosi cutanea. [**Dermal Leishmaniasis.**] - *Giorn. Ital. di Dermat. e Sifil.* 1926. Apr. Year 61. Vol. 67. No. 2. pp. 847–849.

The author has encountered a further 8 cases of oriental sore in eastern Sicily (this *Bulletin*, Vol. 23, p. 108). The paper is of interest in that during treatment by intravenous tartar emetic a mistake led to the injection of 45 and 55 centigrams into two patients. This was followed by severe toxic phenomena—irritation of the cardiovascular and nervous systems, resulting in collapse, headache, torpor, somnolence and loss of consciousness. The digestive system was not seriously affected though there was at first gastralgia and vomiting followed by nausea during the first 24 hours. In one of the two albumin was present in the urine. In the other case there was slight icterus after the second day and enlargement of the liver with urobilin and traces of bile pigment in the urine. The urine of both was examined for antimony on the 5th day, but none was found.

C. M. W.

PARROT (L.) & LESTOQUARD (F.). Sur quelques détails de la structure des leishmania. **Details of the Structure of Leishmania.** - *Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 327–332. With 2 plates (1 coloured). [7 refs.]

By employing a special technique the authors have been able to study some of the minute structural details of *Leishmania tropica*, which are not always evident in films prepared in the usual way. Two methods of preparation are described. Films, presumably the ordinary dried films, containing parasites are fixed in Schaudinn's fixative (alcoholic solution of corrosive sublimate) for 10 minutes and then washed free of fixative by 2 per cent. alcoholic iodine solution and finally in 95 per cent. alcohol to remove all traces of iodine. The films are then dried. The film is then covered with horse serum for ten minutes after which it is dried rapidly in the air. It is then stained for an hour in Giemsa stain 1 in 10. It is important to use in fixation only sublimate solution which has been prepared at least 24 hours before and, in staining, distilled water which is exactly neutral in reaction. In the second method films are fixed in alcoholic iodine solution for 10 minutes and washed in 95 per cent. alcohol till free of iodine. The films are dried, treated with horse serum and again dried as described above and stained with a 10 per cent. solution of tricosinate of methylene (Crétin's formula) for an hour, after which they are washed and dried.

Both methods bring out clearly the minute structure of the parasites, especially the rhizoplast and the superficial capsule. The rhizoplast has been previously described by various observers, but has not always been evident in all the parasites. In films stained by the above procedures it is always distinct and has to be regarded as one of the essential parts of the organism. When the kinetoplast divides the rhizoplast becomes thicker and appears to divide longitudinally, the last part to divide being the end in contact with the capsule of the

parasite. Another feature which is brought out is the capsule itself which is proved to be a definite structure because there occur in the films numerous empty capsules, as also capsules containing the kinetoplast alone or this structure and the rhizoplast. The various structures described are depicted in two plates, one of them coloured.

C. M. W.

MAZZA (Salvador). Existencia de la leishmaniosis cutánea en el perro en la República Argentina. (Nota preliminar.) [**Dermal Leishmaniasis in a Dog in Argentina.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 147–149. With 1 text fig.

It was noted that dogs in the neighbourhood of San Martin de Tabacal (Salta) were liable to ulceration of the base of the ears. In scrapings from an ulcer of one of the animals leishmania were found. The animal was killed and examined. There was no ulceration of the mucosae, while the spleen, liver and bone marrow revealed no parasites. This is the first case of cutaneous leishmaniasis to be recorded in the dog in the Argentine. PEDROSO had previously seen a similar condition in dogs in Brazil.

C. M. W.

i. ESCHBACH (H.). Kala-azar chez un adulte. [**Kala Azar in an Adult.**] —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1926. Nov. 18. Year 42. 3rd Ser. Vol. 50. No. 34. pp. 1568–1570. [3 refs.]

ii. LÉPINE (Pierre). Trois cas syriens de kala-azar infantile. [**Three Cases of Infantile Kala Azar from Syria.** —*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 429–431.

iii. HITTI (Joseph K.). **Infantile Kala Azar in Syria.**—*Jl. Amer. Med. Assoc.* 1926. Oct. 16. Vol. 87. No. 16. p. 1302. [1 ref.]

iv. PATARINO (G. B.). La leishmaniosi a Bari. [**Kala Azar at Bari.**]—*Pediatria.* 1926. Dec. 1. Vol. 34. No. 23. pp. 1323–1325. [4 refs.]

i. The paper describes a case of kala azar in a 24-year old student in Paris. The illness commenced at the beginning of 1925. Previously he had lived in Tunis from April, 1921, to December, 1922, and after that returned to France and had spent a month and a half at Antibes near Cannes whence, in February, 1923, he went to Dijon and finally returned to the centre of France and Paris.

ii. The author describes three cases of infantile kala azar in Syria. The first was diagnosed in the American Hospital at Beyrout. Inquiry showed that the child had come from the district of Djebail in the Libanus where it was suspected a focus of the disease might exist. Investigations of the locality revealed two further cases. This appears to be the first record of kala azar in Syria.

iii. The paper gives a brief description of 5 cases of infantile kala azar in Beyrout in Syria. It appears that 3 of the cases have been reported in the paper by Pierre LÉPINE reviewed above.

iv. Two cases of infantile kala azar occurring at Trani and Bari on the Italian coast about 100 miles north-west of Brindisi.

C. M.W.

i. Agronick (A.). Au sujet de l'épidémiologie et de la clinique de la leishmaniose cutanée. **Epidemiology and Symptomatology of Dermal Leishmaniasis.**]—*Russian Jl. Trop. Méd.* 1926. No. 5. French summary p. 79. [In Russian.]

ii. Cook (Albert R.) & Stones (R. Y.). **A Case of Oriental Sore in an Indian in Uganda.**—*Kenya Med. Jl.* 1926. Aug. Vol. 3. No. 5. pp. 132–133.

iii. Versari (Attilio). Un caso di bottone di Oriente in Provincia de Napoli. Contributo clinico ed istopatologico. [**Oriental Sore in Naples Province.**]—*Pediatria.* 1926. Sept. 15. Vol. 34. No. 18. pp. 977–1000. With 4 text figs. [111 refs.]

i. As a result of the movements of troops during 1914–1922 oriental sore appears to have become more frequent, the infections which had taken place in the southern districts of Russia accounting for the notification of cases in Moscow.

ii. A case of oriental sore was noted in an Indian who was in Basrah in October, 1924. He returned to India, whence he sailed for Uganda on January 17th, 1925. The sore, which occurred on the cheek, first appeared in September, 1925.

iii. The case of oriental sore described is the first to be recorded from the province of Naples.

C. M. W.

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Nicolle (Charles). Quelques considérations sur la leishmaniose tégumentaire américaine.—*Arch. Inst. Pasteur de Tunis.* 1926. June. Vol. 15. No. 2. pp. 108–113. With 4 figs. [*v.* this *Bulletin*, Vol. 23. p. 584].

Parrot (L.) & Foley (H.). Le bouton d'Orient en Algérie, remarques étiologiques et épidémiologiques.—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 333–343. [23 refs.] [*v.* this *Bulletin*, Vol. 23, p. 106.]

## MISCELLANEOUS.

FERNÁNDEZ (Antonio A.). Granuloma ulceroso perianal por un clamidozoario? [**Perianal Ulcerous Granuloma due to Chlamydozoa?**]—*Semana Méd.* 1926. Mar. 25. Vol. 33 .No. 12 (1680). pp. 585–600. With 8 text figs. [11 refs.]

The author describes at great length the case of a man, 29 years of age, with a granulomatous condition of the border of the anus, in parts ulcerating. Smears made from the surface and also from the depth showed staphylococci and small bodies from 0·2 to 1·5 microns in length, some bacillary, others round or pyriform, some intracellular, in the cytoplasm and nucleus of epithelial and leucocytic cells, others free. By inoculation of the emulsified tissue into guineapigs he was able to reproduce the condition and to see in them the same bodies. He discusses the diagnosis of the affection and excludes tuberculosis, syphilis, granuloma venereum, leishmaniasis and purely inflammatory lesions, and concludes that it is an ulcerating granuloma produced by chlamydozoa, transmissible to guineapigs, and cured by novarsenobenzol. The last part of the paper is occupied by a discussion as to the place of chlamydozoa in nature.

H. Harold Scott.

STENHOUSE (H. M.). **The Significance of Cholesterol in Tropical Hydrocele.**—*Amer. Jl. Trop. Med.* 1926. Mar. Vol. 6. No. 2. pp. 143–151. [4 refs.]

This study was made in St. Croix, one of the Virgin Islands, where hydrocele is 30 or 40 times as common as in America, and *Filaria bancrofti* infests practically the entire population at some time in their lives. Cholesterol in hydrocele fluid has been usually regarded as a secondary degenerative product, but the author holds a different view [which, however, he has not succeeded in making clear to the reviewer]. Arteriosclerosis, also very common in St. Croix, he would attribute to the same cause as hydrocele, cholesterol taking a part in its production.

A. G. B.

SMITHIES (Frank). **Protozoiasis occurring in Temperate Zone Residents. A Study of 265 Instances with a Discussion of the Associated Digestive Malfunction.**—*Amer. Jl. Trop. Med.* 1926. Jan. Vol. 6. No. 1. pp. 1–45. With 10 text figs. [19 refs.]

This paper is based on material that has been accumulating during the last 12 years, and its main interest is for the physician. The material is collected from 3,780 patients in the northern temperate zone who came for relief of digestive disorders. Protozoa of some sort were discovered in the stools of 265 of them (7 per cent.). The age of the protozoa-patients ranged from 7 to 81 years; 172 were males and 93 females. The species of protozoa recognized were *Trichomonas intestinalis* in 78 instances, *Cercomonas intestinalis* in 71, *Chilomastix mesnili* in 22, *Entamoeba histolytica* in 38, *E. coli* in 19, undetermined Entamoebae in 3, *Balantidium coli* in 7, Giardia in 14. The frequency with which the initial dyspepsia could be traced to the drinking of dirty water, or to the consumption of dubious garden produce, or to the seasons of plentiful fruit and vegetables is emphasized.

Diarrhoea was the leading symptom in 205 of the 265 protozoa-patients, and the author proposes a theory that it is due to poisons (toxic amines) produced by the catabolic action of intestinal bacteria of the colon group upon the dead protozoa. Constipation was a leading symptom in 13 patients, and these patients were specially "toxic." The stools were normal in 17. Abdominal tenderness was most common in the ilio-caecal region, and might also be detected in the region of the gall-bladder. In 188 cases the red-cell-count was below four million, and in 29 the anaemia was of the pernicious type; in 34 cases eosinophilia ranged from 6 to 21 per cent. Gastric and pancreatic deficiency were common occurrences. Proctoscopic and roentgen-ray evidence are discussed.

The author's general conclusion seems to be that, aside from the notoriously offensive *Entamoeba histolytica*, *Balantidium coli*, and Giardia, and apart from the possibilities of toxic irritation discussed, such flagellates as Trichomonas and Chilomastix may exercise a definite pathogenous aggravation in cases where the intestine is already damaged from some other cause.

A. A.

ROEGHOLT (M. N.). Rectaal-ulcera en rectaal stenosen. Een klinische Studie. [**Rectal Ulcer and Rectal Stenosis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 2. pp. 278–299. With 4 figs. on 1 plate. [21 refs.]

The etiology of rectal ulcer and stenosis is still very obscure. These conditions are far more prevalent in women than in men, and always situated 3–4 cm. above the anal opening. This indicates that the cause is not an intra-intestinal one, and accordingly syphilis, tuberculosis and dysentery are excluded (though they may produce ulcer and stenosis elsewhere in the intestine). The different anatomical condition of the perineum in man and woman must account for the different predisposition to this affection.

Roegholt gives the reasons for which he incriminates soft chancre as the cause of this affection. The infection of the rectum may be either a direct one by the discharge flowing along the anus, or the infection may reach the rectum by perforation of the recto-vaginal septum, or it may be carried by the infected lymph from the primary sore to the ano-rectal lymph glands and from there to the lining of the rectum in cases in which the inguinal glands are inflamed and blocked.

Roegholt gives detailed description of the clinical picture. Dilation of the stricture never succeeds above a certain limit. In cases of narrow stricture, the author makes an anus praeternaturalis, eventually followed by extirpation of the rectum after a sufficient lapse of time to allow the patient to recuperate. He hopes that the future may bring a rational antibacterial treatment of the affection founded upon the better knowledge of its etiology.

W. J. Bais.

CATANEI (A.). La langue noire pileuse: sa parasitologie, réflexions sur sa pathogénie. [**Hairy Black Tongue: its Parasitology and Pathogeny.**]—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 379–393. [19 refs.]

The author gives the history of black tongue, with an account of the parasites which have been associated with it, a careful description of

one case with laboratory details of a Cryptococcus and a Monilia isolated, and reaches the conclusion that none of the organisms described plays a specific part in its causation. The papers cited are almost all French.

A. G. B.

WELLS (C. R.) & COOPER (G. W.). **Black Tongue.** *U.S. Nav. Med. Bull.* 1926. Jan. Vol. 24. No. 1. pp. 12–30. With 2 figs.

A detailed and learned account of the rare condition known as black tongue, in which subjective symptoms are mild or absent and health is unimpaired. The authors studied two cases. It is described as "primarily a hyperkeratosis of the filiform papillae with the deposit of pigments upon and between the enlarged papillae." The hairy papillae may reach a length of one quarter inch. There is little evidence for a parasitic origin. A similar condition was induced by the application of tincture of nutgalls to the tongue of a normal person three times a day. [The value of the paper would have been enhanced by a bibliography.]

A. G. B.

METZGER (Emy). Studien ueber den Verlauf zweier gleichzeitig gesetzten Infektionen (Malaria und Recurrens). [**The Course of Two Simultaneously Transferred Infections (Malaria and Relapsing Fever).**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1926. June 28. Vol. 47. No. 6. pp. 545–554. [8 refs.]

A paper from the Psychiatric Clinic at Frankfort. In three cases of general paralysis the patient was infected with malaria and relapsing fever, either simultaneously or in succession, and the course of the temperature, blood findings, and results of inoculations to mice are given. The following conclusions were reached :—

If one infects a paralytic with malaria and relapsing fever simultaneously, the malaria holds the relapsing fever in a depression (Depression immunity of MORGENROTH) ; the relapsing fever does not run its normal course till the malaria is cut short. The result is the same if one infects with relapsing fever after the third malarial relapse. If, however, the relapsing fever is first introduced and malaria after the first recurrence, when the malaria develops the spirochaetes disappear from the blood and do not become demonstrable again till the malaria is cut short, but in the author's case there were no further febrile attacks.

A. G. B.

i. EICHELBAUM (H. R.). **Lobar Pneumonia.**—*Fourteenth Ann. Rep. Med. Dept. United Fruit Company. Boston, Mass.* 1925. pp. 202–205.

ii. WALKER (H. M.). **Lobar Pneumonia.**—*Ibid.* pp. 206–207.

iii. MENK (W.). **Report on the Use of Mercurochrome Intravenously in Lobar Pneumonia.**—*Ibid.* pp. 213–217.

i. Lobar pneumonia is responsible for the highest mortality of any disease in Almirante Hospital, Panama. The deaths in 1924 from all

cases were 105 ; pneumonia 33, chronic nephritis 12 and the remainder about equally divided between tuberculosis, heart disease and malaria. Of 200 deaths in 1924 and 1925, 57, or 28·5 per cent., were due to pneumonia ; hookworm, nephritis and malaria were common complications.

Methods of treatment consisted in—digitalis, intramuscular camphorated oil injections, mercurochrome intravenous injections, intramuscular milk injections, with mortality ranging from 48 per cent. (camphorated oil) to 26 per cent. (milk). Mercurochrome tended to produce lung infarction through blood destruction and consequent formation of emboli ; small doses are favoured.

ii. Dr. Walker of Puerto Castilla Hospital, Honduras, finds that pneumonia accounts for 25 per cent. of the mortality at that hospital. In 1924 and 1925 mercurochrome was given intravenously " with a considerable improvement in the mortality rate." The mortality among 84 cases treated with mercurochrome was 27 per cent., and among 16 cases not so treated 43 per cent., or 30 per cent. for the whole series, but it is admitted that some of the latter category were too ill on admission for the administration of the drug. The best results were obtained with doses sufficiently large to cause chill, high fever, vomiting and diarrhoea.

iii. Between June and December, 1925, Dr. Menk treated 60 cases of lobar pneumonia in the Santa Marta Hospital, Colombia, with mercurochrome given intravenously in 1 per cent. solution in doses of 8 to 25 cc. ; the mortality was 25 per cent. In the corresponding period of 1924, 164 cases were treated otherwise, with a death rate of 34 per cent. The author thinks that the untreated severe cases about balance the untreated mild cases.

Age and Mortality—With and Without Mercurochrome.

| Age. | 1924—Without Mercurocrome. | 1925—With Mercurochrome. |
|---|---|---|
| | per cent. | per cent. |
| 15 to 25 years, inclusive | 62 cases—Mortality 30·65 | 17 cases—Mortality 5·88 |
| 25 to 35 ,, ,, | 56 ,, — ,, 26·8 | 22 ,, — ,, 31·8 |
| 35 to 45 ,, ,, | 30 ,, — ,, 50·0 | 17 ,, — ,, 29·0 |
| Above 45 ,, ,, | 16 ,, — ,, 42·5 | 3 ,, — ,, 33·3 |
| | | 1 case, age not recorded, died. |

He calls attention to the low mortality rate in the 15 to 25 age series treated with mercurochrome [a small series]. From other data he deduces the importance of early administration. Later, the resistance " is too low for us to expect striking results from a drug which probably owes its therapeutic value to its activating the defensive power of the organism." He finds that one can rarely give 15 cc. of 1 per cent. mercurochrome solution to an average adult case of pneumonia without danger of producing pronounced reaction or toxic symptoms. A series of 12 treated cases was carefully studied to see the effect of the drug on the white blood and differential leucocyte counts, and the results are tabulated, the counts being made before the treatment and 3, 6, and 24 hours after. The general reaction was found to resemble closely that produced by the so-called non-specific stimulation therapy. In all cases the total leucocyte count was increased, the increase ranging from 2,000 to 20,000 three hours after the injection.

The conclusion is that mercurochrome is an additional useful drug in pneumonia therapy, but far from ideal. Most of the native labourers are weakened by chronic infections, parasites and poor living, and these matters must be looked to.

A. G. B.

LAGRANGE (E.). A propos de quelques observations d'abcès de la rate. [**Some Observations of Splenic Abscess.**]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 421–426. [12 refs.]

This paper is based on the recollection of three cases which occurred at Usumbura, north of Lake Tanganyika, in the East African campaign in 1916, and on a study of the published papers. The three cases occurred in 15 autopsies of natives. In two, chocolate pus, without odour, filled the abdominal cavity, and the spleen was diffluent; in the third, there were numerous pea-sized abscesses. The spleens were not notably large and no cause was revealed by blood examination; no bacteriological search was made. The author refers to the observations of WALLACE in Rhodesia (this *Bulletin*, Vol. 19, p. 616) and of LOEVENBRUCK in Katanga (*l.c.* Vol. 22, p. 673); the former reported the occurrence of some hundreds of cases* between 1922 and 1924. The author's three cases occurred during a violent epidemic of tick fever in troops which were afterwards transferred to Katanga, and he notes the close association between this region and Northern Rhodesia. (Incidentally, we learn that later in the year, Ornithodorus were found in the bark of a mango tree, which grew close to the site of a cook-house burnt by the Germans "a long time before" because of tick infestation.) The author would be satisfied with the relapsing fever origin of these cases, had not another autopsy at the same time revealed swollen and ulcerating Peyer's patches, evidence of enteric. He recalls that spirochaetes were discovered in one of WALLACE's cases and notes that typhoid bacilli have been found in splenic abscesses by two authors. He concludes that under the influence of unknown factors bound up with geographical factors, certain viruses may acquire unusual tropisms. [He makes no reference to the gas noted by both WALLACE and LOEVENBRUCK, nor to a possible amoebic origin of such abscesses. It seems probable that there are several independent causes of splenic abscess in Tropical Africa.]

A. G. B.

PANAYOTATOU (Angélique). Rougeole et dysenterie. Sur une épidémie de rougeole à Alexandrie. La rougeole et ses complications aux polycliniques des femmes et enfants (1925–1926). [**Measles and Amoebic Dysentery at Alexandria 1925-6**].—*Rev. d'Hygiène.* 1926. June. Vol. 48. No. 6. pp. 558–562.

It is well known that the commonest complication of measles is broncho-pneumonia. At Alexandria in the epidemic mentioned amoebic dysentery took the first place, coming on during convalescence. Of 132 cases of measles seen at two polyclinics, 55 were followed by

* An instance of the exaggerations which creep into abstracts of medical papers. WALLACE speaks of 49 cases, and "several cases in other parts of Northern Rhodesia."

amoebic dysentery, microscopically confirmed in 35 and considered proved by the curative effect of emetine in 10; only 25 cases were complicated by bronchitis. It is stated that the majority of the cases were under one year, and of these 90 per cent. died. These children were being suckled, and the author thinks that the amoebic infection was derived from the soiled hands of the mothers.

A. G. B.

SHANKS (G.) & KHAN (G. P.). **The Diagnosis of Typhoid-like Fevers, with Special Reference to Typhoid and Kala-Azar.** —*Indian Med. Gaz.* 1926. July. Vol. 61. No. 7. pp. 324–327. With 3 charts. [2 refs.]

The authors note that when enteric fevers occur in the temperate zone, where many have been inoculated, diagnosis is not easy unless a positive blood culture is obtained. In Bengal diagnosis is difficult for another reason, viz., the clinical similarity between typhoid and kala azar. At the laboratory of the Medical College, Calcutta, the following procedures are carried out :—

"(1) Culture of the blood. (2) Blood serum reactions. (3) Cultures of urine and faeces. (4) Microscopical examination of the blood. (5) Puncture of the spleen, and rarely of the liver."

"(1) Ten cubic centimeters of blood are removed, and seven cubic centimeters of this are put in a tube containing about 10 cc. of normal saline, with 1 per cent. of sodium citrate. This tube is brought to the laboratory and the major portion is transferred to a flask containing 50 cc. of 2 per cent. glucose broth; a small portion is left for culture on N.N.N. medium. The remainder of the blood—about three cubic centimeters—is put in a sterile tube for separation of the serum. This simplified procedure has two advantages; it is not necessary to carry around the flask of easily contaminated medium, and it enables cultures for flagellates and other organisms to be made with the same specimen of blood and from the same tube.

"The time elapsing between the taking of the blood and the transfer of the citrated blood to the flask of 2 per cent. glucose broth does not usually exceed half an hour. When the citrated blood has been added to the glucose broth the final dilution of sodium citrate is approximately 0·15 per cent., which is about the optimum advocated by Wright after experiments in cases of sub-acute infective endocarditis. By this method organisms of the typhoid group, streptococci, pneumococci and meningococci have grown well in blood cultures."

(2) The blood serum reactions are Napier's aldehyde reaction and the agglutination reaction. The latter is carried out by Professor DREYER's method. A table is given showing that in a series of 197 cases in which a definite diagnosis of kala azar was made, the Widal reaction was entirely negative. Both these tests are in the authors' opinion very reliable.

They have had five cases in which typhoid was followed by kala azar and three in which the reverse occurred. Temperature charts of two of these cases are given.

A. G. B.

JAMISON (S. Chaille). **Pernicious Anemia in the North American Negro.** —*Southern Med. Jl.* 1926. Aug. Vol. 19. No. 8. pp. 583–584. [13 refs.]

Of 122,524 patients admitted to the Charity Hospital of New Orleans in six years 25 per cent. were negroes; pernicious anaemia was diagnosed 42 times in white patients and 12 times in the negro, but it is stated that all with any trace of negro blood are placed in the latter category.

A. G. B.

GREEN-ARMYTAGE (V. B.). **Infantile Cirrhosis of the Liver.**—*Indian Med. Gaz.* 1926. Sept. Vol. 61. No. 9. pp. 441–444.

A practical paper from the Second Professor of Gynaecology, Calcutta Medical College, giving a detailed account of this Indian disease and its treatment. He has seen 63 advanced cases in the last seven years, 27 in Europeans or Anglo-Indians, 30 in Hindus and six in Mahomedans. The ages have been between 5 months and 3½ years; 17 were on the breast. In all the remainder there were obvious dietetic errors, and 33 were being fed on patent foods, supplemented by sweets. The additional work thus thrown on the liver causes enlargement due to swelling and congestion of the cells, and, later, contraction, in consequence of the reactive intercellular fibrosis; the author calls the disease intercellular hepatic cirrhosis.

Etiology.—(1) Deficiency in vitamins of the pregnant women's diet, reacting both on the mammary secretion and the endocrine system of the foetus. (2) Pyorrhoea, anaemia and constipation in the mother, leading to secretion of a milk "lacking in stimulatory hormones," calcium, iodine, etc. (3) Overfeeding of the child. (4) The feeding of milch animals for several months of the year on dry fodder.

Symptoms.—The onset is insidious and in a minor degree the disease occurs more frequently than is supposed. The early symptoms are low fever, with constipation and earthy offensive stools. The liver is large and tender, the skin dry, the feet often oedematous; later there is ascites and the liver shrinks. In every case the diagnosis of kala azar, syphilis and malaria was excluded.

Prevention.—The mother must be fed properly in the antenatal and nursing periods, and Major Green-Armytage gives a detailed list of what she may and may not eat. When weaning occurs, the milk affording animal must be properly fed. Avoid patent foods and sweets for the child. Give 2–3 oz. fresh fruit juice daily. "All children, European or Indian, should be allowed out in the sun from 6 to 9 a.m., and from 3 to 6 p.m.—that is when the ultra-violet rays of the sun are at their 'maximum'." As vegetables in Bengal are wanting in salts, add iodized salt, e.g., iodosol, to all food.

The treatment of the child is described in minute particulars for the first 14 days; it begins with barley water or rice water on the first day and skimmed, or fat-free, milk from the second day. Plenty of fruit juice is given. A few days semi-starvation will cure the very early cases.

Prognosis.—When cases are seen early, and the parents attend to instruction, recovery occurs in 6 to 10 weeks. Later cases with jaundice or ascites never recover.

A. G. B.

DEN HARTOG (B. J. C.). Een geval van lymphatische leukaemie bij een Javaansche vrouw. [**A Case of Lymphatic Leukaemia in a Javanese Woman.**] *Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 2. pp. 252–259. With 5 figs. on 1 folding plate. [5 refs.]

Leukaemia is apparently a very uncommon disease in the Malay race. The author describes a case in a Javanese woman who died during sleep without previous complaint of any importance. Post-mortem

examination showed a lymphatic leukaemia marked by much heterotopic growth in pleura (with haemorrhagic exudate), heart, ovary, uterus and salivary glands.

Locally a neoplastic character was noticed. At the site of the thymus gland a tumour was found without any trace of thymus tissue, but containing lymphoglandular and fat tissue.

W. J. Bais.

SMITH (E. C.). **Cancrum Oris in a Case of Leukaemia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Jan. 21. Vol. 19. No. 7. pp. 394–396.

A Kroo-boy was admitted to hospital with cancrum oris and died the same night. An account is given of the macroscopic and microscopic appearances of the organs and tissues. The leukaemia was myelogenous. Both diseases are rare in Lagos.

A. G. B.

LIÉGEOIS (M.) & FOULON. Septicémie méningococcique à type pseudo-palustre améningitique. Guérison obtenue par la sérotherapie intraveineuse. [**Meningococcus Septicaemia of Pseudo-malarial Type without Meningitis.**]—*Arch. Méd. et Pharm. Milit.* 1926. Jan. Vol. 84. No. 1. pp. 51–56. With 1 chart.

During an epidemic of cerebrospinal meningitis at Coblenz, a soldier was admitted to hospital on March 14th with "loss of flesh and erythema nodosum." The history was of frequent febrile attacks since January 25th, sometimes daily, sometimes separated by one or two days, pains in the joints, and eruptive patches. His general state was good, and he made no complaint of feeling ill. On the third day a blood culture revealed the diplococcus, and no malarial parasites could be found. Serum treatment checked the fever and after a second series of injections the patient recovered, the temperature becoming normal on April 14th. The duration of the illness was nearly three months. There was never any symptom of meningitis. Many similar cases, the authors say, have been published.

A. G. B.

GLÖKLER (Fritz). Ein Beitrag zur Schweineborstenkrankheit. [**Pig's Bristl Disease.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Apr. 1. Vol. 30. No. 4. pp. 157–160.

A condition described by the Chinese in which pig's bristles are said to grow in the skin of the chest and back; unless they be removed, the quacks say, the issue is fatal. In a case seen by the author a decoction of fowl's feathers was rubbed on the skin and the "pig's bristles" proved to be portion of feather lying on, not in the skin. The "disease" was reproduced on the author's arm and that of his cook.

A. G. B.

CASTELLANI (Aldo). **Importance of Symbiosis, or Close Association of Different Species of Organism, in the Production of certain Biochemical Phenomena and in the Causation of certain Diseases and certain Symptoms of Diseases.**—*Jl. Amer. Med. Assoc.* 1926. July 3. Vol. 87. No. 1. pp. 15–22. With 5 text figs. [2 refs.]

On the text that "symbiosis has so far attracted little attention from medical men and bacteriologists," the author develops the argument that symbiosis may play an important part in biochemical phenomena and in the causation of specific diseases. As examples of such diseases he mentions trichomycosis rubra and nigra, and stomatitis

cryptococcobacillaris ; as examples of symptoms of disease caused by symbiosis he gives the mousy smell in favus, the honey-yellow crusts in yaws, the tympanitis in some cases of typhoid. In his applications the author limits the term " symbiosis " to associations of different forms of life in a relation that is not detrimental to either ; though he also recognizes that the term in biology is generally applied to different forms of life that are inexorably associated for mutual benefit. The association that he has in mind appears therefore to come rather within the term " commensalism " as used by zoologists. But apart from all definitions the subject is one of extraordinary interest.

A. Alcock.

LIPPINCOTT (Leon S.). **Blood Counts in Mississippi.**—*Jl. Lab. & Clin. Med.* 1926. Mar. Vol. 11. No. 6. pp. 524–527. [9 refs.]

These studies (3,045 counts) of blood in Mississippi were part of the routine of the hospital laboratory ; but children's counts and counts with high eosinophile percentage indicative of animal parasites are not included in the conclusions, the chief of which are as follows : That the normal total leucocyte average for the locality is between 7,000 and 8,000 ; that there is not any marked difference in total leucocyte counts of whites and negroes, nor—except that basophile percentage is lower in negroes—in differential leucocyte counts ; that the small mononuclear percentage is normally higher than the usually accepted maximum ; that the polymorphonuclear neutrophile percentage is near the usually accepted minimum ; that the normal eosinophile count is less than 1 per cent. ; that the normal basophile count is less than the usual standard of 0·5 per cent., and is specially low in negroes ; that in total counts below 5,000 the mononuclear percentages are increased at the expense of the neutrophiles, and that in total counts above 10,000 the polymorphonuclear neutrophiles are in general below text-book expectations.

A. A.

NIGERIA. **Scientific Papers.**—*Ann. Med. & San. Rep. Nigeria 1924.* Appendix IV. pp. 63–72.

Under this heading are some observations of general interest. We learn that one of the chief problems which confront the surgeons in West Africa is the operative treatment of the enormous (usually sliding) hernias that are so commonly met with. The methods are discussed ; in any event truss wearing is necessary for the rest of life. The spleen was excised in a male African aged 25, who was anaemic, complained of an aching pain, and whose temperature ranged between 99 and 100° daily. The spleen, which projected two inches below the costal margin, was probably of malarial origin. Blood counts were made twice but there is no mention of a search for parasites. The excision was done after a course of quinine and syphilitic treatment, and resulted in abolition of pain and fever and cure of the anaemia 12 weeks later. A general description is given of cases of cirrhosis of the liver with enormous ascites in patients about 30. In most instances alcohol is not a cause and the writer suspects syphilis.

A case of abscess of the spleen at Port Harcourt, reported by Dr. H. R. M. FERGUSON, proved to be due to *E. histolytica* which abounded in the pus. Dr. FERGUSON describes nine cases of appendicitis seen in 1924 but gives no indication of the race of the subjects.

A case of trypanosomiasis in a fox terrier, treated by Dr. GRIEVE, went from bad to worse till one-eighth of a grain of tartar emetic was given in the muscles and afterwards one-sixth every few days; trypanosomes had not been seen again six months later.

Of 132 cases of tetanus treated at the Colonial Hospital, Lagos, between April and December, 1924, and reported by Dr. W. R. PARKINSON, 54 died, a death rate of 40·9 per cent., which compares very favourably with the average rate in tetanus. In 9–10 of these cases, infection probably entered through small wounds of the feet, usually chigger wounds. These cases are milder than ordinary traumatic cases, and the writer thinks that the chigger patients become to some extent immune by getting frequent small doses of bacilli. In treatment he uses 1,500 units of anti-tetanus serum, as compared with the much larger dose recommended by the British War Office Tetanus Committee; intrathecal treatment was tried without success. The author strongly advocates magnesium sulphate in 20 per cent. solution, 5 cc. intramuscularly once or twice daily according to the frequency of the spasms, and believes it to be of enormous value.

A. G. B.

HOMMA (Hans). **On Apocrine Sweatglands in White and Negro Men and Women.**—*Bull. Johns Hopkins Hospital.* 1926. May. Vol. 38. No. 5. pp. 365–371. [5 refs.]

There are two types of sweat-glands, the exocrine or "e" and the apocrine or "a" type which may be traced through the range of mammals up to man. (SCHIEFFERDECKER, 1922).

"The exocrine glands produce a fluid which is formed as little droplets within the protoplasm of the epithelial cells of the sweat-gland and then is pushed out into the lumen of the gland without any loss of protoplasmic substance. With the apocrine type, however, a part of the secreting cell itself is lost during secretion.

"The exocrine glands start from the free surface of the skin, while the apocrine glands take origin from a hairfollicle. After the formation of the gland, it may happen that the aperture of the duct wanders from the hairfollicle to the free surface. On the other hand, the aperture belonging to an exocrine gland never wanders into a hairfollicle.

"On account of this characteristic in the origin of the glands, it is plain that apocrine glands can be found only where hairs occur at some time of life. The palms and soles are free from them."

The apocrine glands occur in man only in certain places, such as in the axilla, external ear duct, and more sparsely around the nipple and anus. The author has examined skin from 12 white and 13 coloured men and women in the post-mortem room at the Johns Hopkins Hospital, avoiding mixtures of races. He tabulates his results and gives the following summary:—

"The assumption of Schiefferdecker that a-glands were more frequent in negroes than in white people has been proved for the four regions examined; a-glands have been found in the skin of coloured three times as often as in that of white people.

"We never found a-glands in the skin from the breast of white men; occasionally they occur in the skin from the breast of negroes.

"The largest amount of a-glands in the examined regions was found in the skin of the mons veneris; then comes the skin around the anus, then that of the abdomen, and last, that of the breast.

"There is no difference between the frequency of iron in the a-glands of white and coloured people; nor is there any difference between men and women in this respect. In about 70 per cent. of the specimens showing a-glands, iron is found in their epithelium. This finding is characteristic for all the apocrine sweat-glands of the human body and not only for those of the axilla, as assumed in my former article."

A. G. B.

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## REVIEWS AND NOTICES.

RIGOLLET, MOTAIS, DUMAS (Raoul), LE DENTU (René), LASNET & CAMAIL. Maladies chirurgicales et oculaires aux colonies. Service de santé des expéditions coloniales. [**Surgical and Ocular Diseases of the Colonies. Health Service of Colonial Expeditions.**]—*Grall & Clarac: Traité Pratique de Pathologie Exotique Clinique et Thérapeutique.* Fasc. VIII. 638 pp. With 147 text figs. 1922. Paris: Librairie J. B. Baillière et Fils. 19 rue Hautefeuille. [8*s.* 6*d.*]

This, the eighth volume of a 9-volume treaty on Tropical Diseases, deals with surgical conditions, eye diseases and medical services for Colonial military expeditions. The first 120 pages are devoted to general considerations of trauma, shock, haemorrhage, etc., tetanus and phagedena, together with methods of surgical intervention and anaesthesia. Succeeding chapters treat of rupture and abscess of the spleen, cancer in Europeans and natives in the colonies, umbilical hernia, keloid, porters' lipoma (chronic bursitis), le "Mangy" [a chronic swelling of the parotid glands observed in Madagascar and recognized by the reviewer in Central Africa], vesical calculus, goundou. There then follow 150 pages given up to a diversity of subjects associated with obstetrics, including infant feeding and puericulture with some statistics of uncertain value on presentation, birth-rate, frequency of premature birth and twins, maternal and infant mortality. Diseases of the eye are then covered in 140 pages followed by 50 pages on liver abscess, and lastly nearly 200 pages are allotted to the organization of medical services for expeditionary forces in the colonies.

Published in 1922 there is nothing of novelty in this volume, and the English reader will find little of value to himself. The surgical aspects of elephantiasis, hydatid disease and schistosomiasis find no place here, neither are tropical ulcer, madura foot, climatic bubo nor granuloma venereum dealt with; perhaps they are included in other volumes. Malaria is quoted as the most frequent cause of splenic abscess, and there is no reference to the series of cases in natives reported from Rhodesia.

H. S. Stannus.

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